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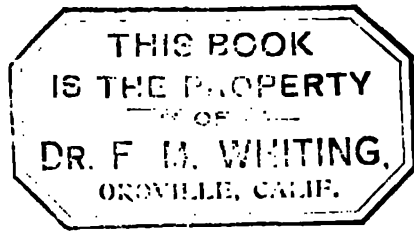
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TREATMENT

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YNÆCOLOGY

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A SYSTEM OF TREATMENT

In Four Volumes

VOLUME IV.

OBSTETRICS AND GYNÆCOLOGY

A SYSTEM OF TREATMENT

IN FOUR VOLUMES

Volume I. General Medicine and Surgery

Volume II. General Medicine and Surgery

Volume III. Special Subjects

Volume IV. Obstetrics and Gynæcology

A SYSTEM OF TREATMENT

BY MANY WRITERS

EDITED BY

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VOLUME IV.

OBSTETRICS AND GYNÆCOLOGY

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PREFACE.

DURING the last ten years our knowledge of the measures available for the treatment of disease and the relief of symptoms has become more scientific and therefore more definite in its application. Not only have many of our ideas undergone profound modification, but new fields of work, some of great promise, have been discovered. Of these we may instance Vaccine Therapy, X-ray Therapy, Radium Therapy, Ionic Medication and measures dependent on improved methods of observation and diagnosis such as Bronchoscopy. The subject of the treatment of disease consequently has become more specialised and makes greater demands upon all branches of the medical profession than formerly.

The aim of these volumes is to provide the General Practitioner with a series of practical articles, in as concise a form as possible, describing the modern methods of dealing with all diseases and written by those who have had special experience in the subjects with which they deal.

There are many difficulties in preparing such a work as this. Our knowledge is not yet sufficiently exact to permit dogmatic expression in all instances, or to enable us to differentiate sharply between the various forms of disease. It is therefore inevitable that certain articles should overlap, and that there should be legitimate differences of opinion not only in the subject-matter itself but also with regard to the classification adopted. The Editors have always been guided in their final decision by considerations of convenience rather than of strict symmetry. They recognise that their decisions are therefore open to criticism and will gladly welcome suggestions, either for alterations or additions, to be incorporated in future issues.

This "System of Treatment" was commenced rather less than two years ago, and it is hoped that no material addition to our knowledge made during that period has been omitted. The attempt to keep thoroughly abreast of these additions has been rendered rather more difficult than usual by the decision to issue all four volumes simultaneously, and to provide each with an index which is complete for the whole work.

The Editors wish to express their gratitude to a large number

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of their colleagues who have in one way or another generously come to their assistance. Sir Patrick Manson, Sir Havelock Charles, Dr. St. Clair Thompson, Dr. Risien Russell, Dr. Gordon Holmes, Mr. Richard Lake and Mr. Victor Bonney have advised them with regard to those departments of Medicine and Surgery with which their names are associated. Dr. Nachbar has kindly given his advice and has also revised a number of the manuscripts. Dr. Torrens and Mr. Frankau, respectively Medical and Surgical Registrar at St. George's Hospital, have acted as sub-editors, reading all the manuscripts and assisting in the passage of proofs through the Press.

The Editors are also indebted to Mr. Charles Hewitt for the preparation of the complete index attached to each volume, to Mr. A. L. Clarke for the correction of the references, and to Mr. J. D. Marshall, of Messrs. Bell and Croyden, who is responsible for the correctness of the various prescriptions.

In addition to the many original illustrations a number of others have been kindly lent by different authors and publishers. These are duly acknowledged in the text.

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A SYSTEM OF TREATMENT.

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THE GENERAL MANAGEMENT OF PREGNANCY.

THE ideal result of obstetric therapeutics is a comfortable pregnancy followed by a painless delivery, a healthy happy mother, and a living healthy child. It should be the physician's object to meet and combat all the ills incident to the pregnant state so as to render the nine months during which the development and growth of the unborn infant are going on as free from suffering and as little irksome as possible. In too many cases even now he neglects his pregnant patients, leaving them to go to the nurse whom they may have engaged for the minor ailments which they ought to bring to him; he contents himself with a visit or two during the many months of the gestation, with a few indefinite words of advice about the bowels, about exercise, diet and the like, and he tests the urine for albumen now and perhaps again. In some instances he does still less, waiting till his patient sends for him, often not till the second stage of labour has begun; so he confesses that he does not regard pregnancy as a time requiring medical supervision, or as a state capable of receiving benefit therefrom.

The general practitioner, and much more the obstetric physician, is surely wrong in this matter. It is admitted that certain of the maladies of pregnancy, *e.g.*, hyperemesis gravidarum, eclampsia, chorea, jaundice, are of a most intractable nature, that in their later stages they are almost hopeless, and that two lives may thus be sacrificed, a mother's and an unborn child's; it is allowed that even under the best circumstances gestation is a period of nine months strain and stress when all the organs and tissues of the maternal economy are being tested and tried by the new calls that are being made upon them; and it is granted that the resources of medicine,

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of hygiene, and occasionally of surgery are capable of removing many of the minor ailments of this period in a woman's life, and of preventing altogether or of ameliorating some, at least, of the gravest complications which may arise in it. The medical man, therefore, ought readily to offer help to his pregnant patients; he ought to tell them that the little discomforts which arise are capable of amelioration; he ought to hint that there are possibilities of evil which, if recognised and treated in time, may be prevented from going on to disaster; and if he once succeeds in proving himself useful in removing even the lesser troubles of the pregnant state, he will find his patients as ready to send for him or come to him in the nine months preceding labour as they are prepared to accept his attentions at the confinement, and in the days of the puerperium. When one comes to think of it, it is amazing that so many doctors are willing to accept the risks entailed by attendance upon the labours of women of whose physical state prior to confinement they have little or no knowledge. To give but one instance: A medical man is engaged to attend a primipara; he makes no examination or mensuration of the birth canals, but tells her to send for him when she has good pains; then, in the second stage of labour, perhaps he finds that she has a pelvis so contracted that the birth of her child is only possible by the aid of craniotomy or of Cæsarean section. Surely such a case should be regarded as an obstetric catastrophe; certainly early pelvimetry would have made it possible to have introduced measures less destructive to the infant and less dangerous to the mother than those of necessity employed. Let the practitioner boldly enter into the possession of this field of obstetric diagnosis and treatment (preventive as well as curative); let him but prove his power of removing the minor ailments of pregnancy, and of ameliorating the major maladies, and assuredly he shall not lack patients ready to come to him for aid in the long and often weary months of a disordered gestation.

But it is not only in private practice that there is a necessity for the systematic study and treatment of the diseases and derangements of pregnant women. For ten years or more the writer has persistently urged the establishment of prematernity departments in connection with lying-in institutions³⁶⁻³⁸; some beds, a ward, or a pavilion should be set apart for the reception of cases of pregnancy in which abnormal symptoms have appeared or are feared. The need of some such clinical provision has been widely recognised, but as yet few steps have been taken to translate theoretical requirements into actual practice. Still, something has been done, and a prematernity bed in the Edinburgh Royal Maternity and Simpson

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Memorial Hospital was endowed and made available as far back as 1901; latterly a prematernity ward has been set apart and has generally been well filled with suitable cases. In fact, medical practitioners in the neighbourhood have been very ready to take advantage of the accommodation thus made available, and have many a time sent in patients suffering from the diseases incidental to, or accidental in, pregnancy. The writer also has been able to publish lists of cases so dealt with, and to show that the diagnosis of morbid pregnancies can thus be perfected and treatment employed in a way which is hardly possible in the patient's own home; further, much information regarding problems in the pathology of pregnancy has by this means been obtained. All new maternity hospitals should be provided with prematernity departments for the reception and treatment of patients who are pregnant and are suffering from one or other of the maladies of gestation.

The General Treatment of a pregnant patient may now be sketched. Let us suppose that a healthy primipara of twenty-five or twenty-six years of age comes to her medical attendant at the fourth month of her pregnancy for advice, and in order to ascertain the probable date of her confinement, and the time for engaging her nurse. From her history, which is that of complete menstrual suppression following upon marriage, and preceded by some ten or twelve years of menstrual regularity, there is a strong presumption that she is pregnant; and the provisional diagnosis of gestation is strengthened by the examination of the breasts (showing enlargement, mammary areola, Montgomery's follicles, striæ, and enlargement of veins, along with the presence of colostrum or immature milk), and by the bimanual palpation of the pelvic organs (which discovers cervical softening, Hegar's sign of softness and compressibility of the lower uterine segment, along with some enlargement, often asymmetrical, of the body of the uterus, with intermittent hardening of that organ, and possibly vaginal *ballotement*). She will probably tell of morning sickness which has troubled her somewhat for the past two or three months, but is now beginning to lessen; it is hardly likely that she will yet have felt quickening, and the foetal heart will not yet be audible on abdominal auscultation. There may be some dusky discoloration round the vulva (Jacquemier's sign). It is too early for the detection of abdominal enlargement, indeed, in the first two months of pregnancy the anterior abdominal is rather sunken and the umbilical fossa deepened; but later there will be progressive enlargement, and by-and-bye the foetal heart will be heard and the uterine *souffle*, the foetal parts will be felt, and abdominal *ballotement* will be elicited.

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Having made the provisional or the certain diagnosis of pregnancy (according to the stage of gestation arrived at) the medical man will instruct his patient in various matters. He will calculate for her the probable date of her delivery, finding out from her the exact date (if possible) when her last menstrual flow ceased, and counting forward from that day nine months and four or five days (five if February is one of the months included in the calculation, and four if it is not); he will at the same time tell her that there is always a short period of uncertainty, and that she need feel no anxiety if the supervention of labour is delayed a few days or occurs a week earlier; he will, therefore, advise her to engage her monthly nurse for a date preceding that named by a few days, and he will volunteer to interview the nurse of her choice, or to supply her with names of suitable nurses from his list. There is an obvious advantage in the medical attendant supervising from the very first the nursing of his patient, and the doctor and nurse ought to be known to each other before they meet at the patient's bedside at the time of the confinement.

The patient can in the next place be warned regarding some of the danger signals of morbid pregnancy. It will be well, for instance, for her to know that pain in the back and a red vaginal discharge usually indicates a threatened abortion, and that if these two symptoms together, or the discharge alone occurs, she should keep at rest in bed and send for her physician. There is no more fertile cause of reproductive catastrophe in early married life than a neglected miscarriage; contrariwise, the medical man can be of no greater assistance to his young patient than by preventing or arresting such an unhappy event. Of course, his power for good will be greatly increased if his patient will come to him in the second month of pregnancy, for as is well known the interruption of gestation is particularly liable to occur between the third and fourth months. Early consultations in pregnancy are absolutely essential if the management of that state is to be raised to a high level of efficiency. Another danger symptom or complex of symptoms is persistent headache, accompanied by the passing of a smaller quantity of urine than usual, by changes in vision, and by swelling of the face and hands in the morning; these things indicate failing renal function and precede eclampsia. Persistent headache in pregnancy should, therefore, be added to the list of symptoms which send the patient to her doctor. In this connection it may be at once stated that no precaution is of more importance than the regular analysis of the urine throughout the whole course of pregnancy; in the supposed case with which we are dealing it is of

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particular value for the woman is a primigravida, and it is in first pregnancies that this breakdown in the kidneys is most likely to occur. The patient should be instructed to send a specimen of her urine for analysis once every month until the seventh, and thereafter once a fortnight; it will be well also that this very important precaution be not arranged in haphazard fashion, but that a date suitable both to doctor and patient be definitely fixed; if on any occasion the specimen is not forthcoming, the medical man will do well to make a visit and so impress upon the patient the importance he attaches to the urinalysis. So disastrous is eclampsia that no trouble should be grudged to prevent even a single case in a doctor's lifetime; if albumen is detected only once in a thousand cases of pregnancy, it is worth while examining the other nine hundred and ninety-nine urines so as not to miss it. In certain cases it will be advisable that other things than albumen should be looked for, and quantitative analyses of the urea, etc., will have to be made. The patient should also be made aware that morning sickness persisting beyond the fourth month should be reported; that continued constipation, painful or bleeding piles, sleeplessness, undue nervousness and spasmodic movements, and indeed any deviation from the uneventful progress of pregnancy can, if made known, be nearly always greatly benefited if not cured; and that painful or disagreeable symptoms at this time in life are not the inevitable and irremediable accompaniments of pregnancy.

Some doubt may exist as to the propriety of making a vaginal examination on the first occasion of seeing a pregnancy case; but the advantages of so doing are very great. In addition to the greater certainty of diagnosis which it gives in regard to the existence of early pregnancy, there is the possibility of detecting pelvic contraction or the presence of tumours (ovarian cyst or uterine fibroid) at a time when it is possible to deal with such things in a more satisfactory way than at the full term of gestation. Further, the occurrence or retention of urine or even of simple dysuria should make a vaginal examination imperative, for it is more than likely that there is a retroversion of the gravid uterus, which will require reposition before the pregnancy can go safely forward. Speaking generally, a vaginal examination ought to be made in early pregnancy, but if for any cause the medical man deems it expedient not to make it on his first visit to his patient he should very soon thereafter see her a second time and carry out then his complete investigation of the case.

Before the general laws of hygiene in pregnancy are stated it may be well to point out that although a young unmarried girl may

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and often does break many of the rules of health without apparent ill-consequence, it becomes very difficult for her with impunity to do so after marriage, and during a pregnancy. Dietetic vagaries which passed unmarked in the young girl may be followed by disastrous results in the matron; and the writer could adduce several cases in which indiscretions in the kind of food taken were the causes, in patients with defective renal action, of the super-vention of eclamptic seizures.

Certainly the diet during pregnancy²⁶⁻³⁵ is one of the most important matters requiring supervision. There are some women who think that they are best fulfilling their duty to their unborn child if they greatly increase the amount of food taken; they are following the most dangerous advice of trying to "eat double" because there are now two lives to sustain. It is seldom necessary to increase the meals, for the mother's system, as Bar has shown,²⁶ is capable of extracting more nourishment from the food in pregnancy and so providing for the needs of the fœtus. Mother and unborn infant live together in harmonious symbiosis, not as host and parasite, and in this unique sort of association the fœtus lives upon the mother and yet gives her power to give it life without suffering damage herself. Probably most women, in common with most men, habitually take more nourishment than they can assimilate. It is sometimes necessary to give food to the pregnant patient at more frequent intervals, especially in the later months, but it is rare to need to increase the quantity to any great extent. Whether variations in the quality of the food should be introduced in pregnancy is a more disputable matter. It may be that in the longings of women for unusual articles of diet or for usual articles in unusual amount there is a sort of outcry of the tissues for certain chemical constituents, acids, alkalies, lime, iron and the like, which they lack. If this is so, then it will be desirable not to interfere too much, or, what is better, to supply the needed substances in an agreeable form. There is no doubt that the maternal reserve in iron and lime is severely drawn upon by the fetal requirements in the later months, and I believe that I have seen good results follow, both for mother and child, from the administration of these materials. Possibly too exclusive a meat diet may do harm (Watson³⁵), but the safest conclusion at which to arrive is that the pregnant woman should take an ordinary healthy dietary, not omitting fruit and vegetables, but avoiding sweet things, pastry and highly seasoned dishes; if towards the end of gestation there are signs that she is getting anæmic or is exhibiting what has been termed "decalcification" (pain over bones, difficulty in locomotion,

loss of strength, etc.), then iron or lime should be added in some form or other.

But if there is no need to alter in any important details the ordinary diet of health in pregnancy, it is very important to make sure that the patient has a plentiful supply of water and that the kidneys are kept acting freely. I have several times seen the best results follow the taking of a tumblerful of hot water morning and evening; and when pregnancy is abnormal this procedure is beneficial. The troublesome dyspeptic symptoms of the later months, persistent eczema, constipation and other minor ailments of gestation are benefited by so doing.

When albuminuria is found to co-exist with pregnancy a very radical change in the diet must be insisted upon; for some days milk and potash water only should be allowed.

Perhaps reference ought here to be made to the special dieting of pregnant women who have pelvic contraction with the purpose of diminishing the bulk of the fœtus and the thickness and resistance of the intra-pelvic musculature and fascia.³⁴ The plan is known as Prochownick's, and it consists mainly in the omission from the dietary of water, soups, potatoes, sugar and beer, and in the giving of meat, eggs, fish, bread, salad, cheese, biscuits, and small quantities of coffee, tea or milk. It is claimed that in this way the fœtus is so reduced in size (without being reduced in strength) and the pelvic tissues so denuded of fat, that labour, even when the contraction is marked, becomes not only possible but safe. Further evidence is needed, however, before this method can be relied upon, although there is considerable clinical and some experimental proof forthcoming. (*See also* p. 174.)

Exercise is a matter which is apt to be neglected by the pregnant woman, especially if she is a primigravida and shy about her condition. She ought to be encouraged to take daily exercise, not, however, of a severe or exhausting type. Walking is best, but if that is impossible carriage exercise or motoring may take its place; in my opinion a large, smoothly running motor with a careful driver is as safe as, and probably more invigorating, than a carriage. Bicycling in the early months is to be discouraged; it will not be attempted in the later months. There are pregnant women, however, who require rest and not exercise, viz., the married women who are working in factories; for them a few weeks' rest before confinement is most beneficial. But married women ought to be set free from factory work when they become expectant mothers. The hours of sleep should be carefully conserved; no one needs sleep more, and the bedroom should be well ventilated and in a

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quiet part of the house. In fact, the pregnant woman should always have an abundance of fresh air ; she should live in rooms with the windows open, and should not frequent crowded entertainments or meetings of any kind. A stuffy hall, an exciting meeting, a constrained posture, and a late hour constitute a combination of adverse circumstances into which no pregnant woman ought to put herself.

Her clothing will require readjustment. Corsets which exercise pressure upon the waist and abdomen must, after the third or fourth month, be given up ; in their place a carefully adapted abdominal supporting belt may be worn with comfort. The weight of the clothes should be borne as far as possible by the shoulders ; the skirts will require to be lengthened in front, for the enlargement of the abdomen carries them forward and upward, and for the same reason the under-garments should be made warmer and more closely fitting. The change in the patient's figure leads to an alteration in her position when standing or walking ; there is an increased convexity (to the front) of the lumbar spine, with a change in the mode of locomotion ; for this reason high-heeled shoes, never very comfortable, should be abandoned. It need hardly be added that circular garters are injurious ; suspenders should always be worn. In many respects the modern dress is unsuitable for the pregnant woman ; it would seem as if Dame Fashion often called upon her votaries to choose between her and comfort and health in child-bearing.

The pregnant woman should continue her habits of cleanliness and bathing, for it is most important that the skin should be acting freely. It will usually be quite safe for her to go on with the form of bathing she has been accustomed to ; but there is no need to begin novel methods at unusual hours, *e.g.*, sea-bathing when one is unaccustomed to it. Friction with the rough towel is helpful in maintaining the action of the skin glands, and it is refreshing as well. The use of a super-fatted soap will generally prevent any tendency to eczema or pruritus. In this connection it is necessary to say a word of warning against too vigorous preparation of the mammary glands for their function ; I doubt whether the so-called hardening of the nipples with eau-de-Cologne or some other form of spirit to prevent them cracking in lactation is really beneficial ; in fact it may rather, if much practised, predispose to the occurrence of fissures and abrasions. The drawing out of the nipples may in most cases be safely left to the infant.

The regulation of the bowels and the prevention of constipation must be closely attended to. Since there is nearly always

costiveness in pregnancy, it will be well to counteract it by food and exercise rather than by the taking of purgative medicines. It is important to remember that many patients who say they have an action of the bowels every day never have an adequate evacuation. The diet ought to include vegetables (*e.g.*, tomatoes, cabbage, greens, etc.), fruit (*e.g.*, oranges, apples, stewed prunes, figs and marmalade), brown bread, oat cakes, porridge with treacle, and, as already noted, a tumblerful of water first thing in the morning. Salt, also, ought not to be omitted, for it tends to counteract constipation. Even when dietetic measures prove insufficient it is not necessary to resort to continual purgation; much help may be got from oil, water, or soap and water enemata, or from glycerine suppositories; and the regular solicitation of the bowels at a set hour each day ought never to be neglected. When, however, it is found necessary to give purgative medicines, it will be wise to choose rather the drugs, such as cascara, aloes and nux vomica, which have a tonic effect upon the intestinal musculature, and to instruct the patient to endeavour to do without such aids as soon as possible. In this connection the giving of medicines during pregnancy may be adverted to. Oxytoxic drugs should, of course, be avoided, lest abortion be provoked or premature labour induced; but it is less generally known and remembered that quinine has such an effect. In these days, when so many people take large doses of quinine (in one form or another) to protect themselves against influenza, it is necessary to bear in mind the effect that this medicine has upon the uterine musculature. Salicine and the salicylates would seem sometimes to have the same action. It will be wise, therefore, for the pregnant woman to avoid these drugs as well as the better known ecbolics, such as ergot, hydrastis, savin and powerful purgatives.

The patient should be kept as free as possible from all mental anxiety, overstrain and worry. Pregnancy is apt to cause some irritability or uncertainty of temper in many cases, and special consideration is called for during these months, and is generally freely given. Too much stress, however, should not be laid upon the ill-effects which it is expected that the sight of unpleasant things or the mental image of horrors may have upon the health of the mother or the structural integrity of the unborn infant. There can be no harm in advising pregnant women not to look at disgusting objects, malformed infants, and the like; but the advice should always be accompanied by a disclaimer of any belief in the power of such mental impressions to imprint themselves as if by photography upon the tissues of the *fœtus in utero*. If the

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mother has any such belief herself, she can generally be comforted and reassured by the statement that the parts of the unborn infant are all fully formed at a much earlier date in pregnancy than that at which the maternal impression took place. The writer does not affirm that unhappy mental states of the mother do not sometimes have an injurious effect upon the child; but he is of opinion that the commonly reported and as commonly accepted stories of women seeing startling things in their pregnancies and of their infants being marked in a similarly horrid way are hardly ever capable of substantiation when scientifically investigated.

There is a matter about which the medical attendant is sometimes at a loss what to advise when called upon for an opinion, viz., sexual relations during pregnancy. It is now much more customary for husband and wife to occupy separate beds, and the practice is a much healthier one; certainly it is wise to recommend that in the early months of pregnancy sexual congress be abstained from. In cases of repeated abortion there can be no doubt that complete abstention is the wise, indeed the only, plan, if the gestation is to be allowed to go on.

In addition to the various matters already referred to, it will be well for the medical man to inspect the room in which the patient expects to be confined. It ought to be a light, well-ventilated room, with no heavy hangings or thick curtains, with no more furniture than what is actually needed in it, with rugs or mats on the floor which can be easily lifted and shaken, and with no bathroom or water closet opening immediately off it; if possible it should be removed as far as practicable from the noisy part of the house. In this room should be stored the mother's accouchement outfit, as it is often called, and the baby's layette; and the getting of these things should not be postponed until within a few days of the expected date of confinement, for labours sometimes come on prematurely. The monthly nurse will be the best person to advise the mother in these matters; but the medical man should make certain that they are being attended to. Other things to be laid in beforehand are feeding-cup, bedpan, a bottle of lysol or other antiseptic, perhaps a douche can, and such necessities as nail brushes, safety pins, etc. Some doctors furnish their patients who are expecting to be mothers with printed cards of instructions for their guidance during pregnancy, and the practice is one to be commended.

The amount of medical supervision given by the medical attendant to his pregnant patient will differ widely in different cases. If she has been supplied with a card of instructions and

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has had the danger symptoms made known to her, she may be left to herself to a large extent; but an occasional visit from her doctor, say once in a month or six weeks, will generally be very welcome, and may be expected to be nearly always helpful, more particularly in a first pregnancy. At any rate, the doctor should have knowledge of his patient during the whole period of gestation.

The management of the serious maladies of pregnancy is dealt with elsewhere in this volume, but here a few words may be inserted regarding some of the minor ailments. Tumultuous fetal movements are sometimes a trial to the patient, more especially in the later months, and they may interfere with sleep. It will often be found to be helpful for the mother to wear an abdominal binder under these circumstances, and to leave or reassume the erect posture not suddenly but gradually. Sometimes the cessation of the fetal movements gives a patient anxiety and she may come to her doctor thinking that her infant is dead; even if he can hear no heart it will be best for him to give a hopeful prognosis, for as a matter of fact the movements may not be felt for a time and yet the child be quite well; the fœtus may be lying in such a position as to prevent the easy hearing of the heart; and even if the obstetrician fears that fetal death has taken place, he will do well not to burden the mother's mind with the disagreeable information. Heartburn in the later months of pregnancy is often very distressing, although not necessarily a symptom of grave import. The trouble is that very often the patient gives up one kind of food after another until she is in danger of starving herself, and having found that no medicine entirely relieves her gives up taking any; she ought to be encouraged to persevere with such a simple remedy as powders of bicarbonate of soda, which at any rate give temporary relief, and she certainly ought not to give up taking nourishment. Married women ought to pay attention to the state of their teeth and of the oral cavity between their pregnancies, for it is advisable that tooth extraction and even tooth-stopping should not be practised when a gestation is in progress; but if there is suffering from toothache a visit should be paid to the dentist, who ought also to be informed of the patient's condition, and who may be able by some simple non-operative method to relieve the trouble temporarily. At the same time it is now known that many surgical operations, if performed with aseptic precautions and on women not prone to abort, may be carried out with safety during pregnancy; but, as a rule, operative procedures on the rectum,

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perineum, and genital organs should be postponed, unless imperatively needed, till after the birth of the child. There are many other minor ailments which may be met with in pregnancy, but there is no space for their separate consideration here; the general rule for their management will be the application to them of the methods of treatment employed in medicine without losing sight of the co-existence of the pregnant state.

The therapeutics of the unborn infant ³⁹⁻⁴¹ have not as yet made much progress. There is the constant difficulty of the uncertainty of the diagnosis of ante-natal maladies to be overcome, and it can never be taken for granted that drugs given to the mother find their way in the same form to the *fœtus in utero*. The ideal condition of pregnancy is *fœtus sanus in matre sana*, but it cannot be concluded, although it may generally be expected, that an apparently healthy mother will give birth to a well-formed, healthy infant. Many cases are on record of women far advanced in disease having plump and healthy looking children, and not uncommonly a well-nourished mother will bring into the world a weak, puny, diseased or malformed infant; it would seem as if in some instances the *fœtus* were nourished at the expense of the mother, whilst in others the mother draws off the increased nutriment to her own organs. These considerations prepare us for the record of small success which awaits us in the domain of ante-natal therapeutics. At the same time there have been indications that the subject is not hopeless; the administration of mercury to the syphilitic woman who has had abortions and stillborn children has not infrequently led to the birth of living and even of healthy infants; the regular use of chlorate of potash during pregnancy has averted a miscarriage or premature labour in patients who have previously had many such disasters; and the giving of chloride of calcium to a hæmophilic woman who had had two hæmophilic male children has been followed by the birth of a healthy boy, who remained free of the bleeding tendency. Phosphorus and the hypophosphites given to the mother would seem to have aided the normal development of the nervous system in the *fœtus* whose brothers and sisters were hydrocephalic or subject to convulsions; and there are other directions in which advances may be looked for (*e.g.*, the vaccination of the pregnant woman during a smallpox epidemic for the sake of her *fœtus*); but the subject has not yet attained that degree of exactness and utility which justifies the giving of further discussion to it here. It may, however, be stated generally that placental disease or placental inadequacy would seem to be the great danger to the healthy development of ante-natal life; and that

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consequently the desideratum is an agent which will maintain the structural integrity of the placenta and restore its functions when they are disordered.

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COMPLICATIONS AND ABNORMALITIES OF PREGNANCY.

ABORTION.

THE term "abortion" has been used to denote the termination of pregnancy by the expulsion of the ovum before the end of the twenty-eighth week, *i.e.*, before viability. The expulsion of the ovum between the twenty-eighth and the fortieth week is spoken of as "premature labour."

The term "miscarriage" is generally used to denote the expulsion of the ovum at any time during the first twelve weeks of pregnancy. Others again restrict the word "abortion" to the termination of pregnancy by criminal means.

For ordinary usage abortion may be taken to mean the expulsion of the ovum at any time up to the twenty-eighth week, premature labour denoting parturition occurring at any time between that period of pregnancy and full term.

Abortion is more likely to occur on days on which menstruation would have set in if the patient had not become pregnant. In early pregnancy abortion gives rise to no symptoms other than hæmorrhage and some pain, and may be mistaken for an unusually profuse menstrual period. Later, during the fourth and fifth months, pain is much more marked. Towards the end of pregnancy the process does not markedly differ in any respect from labour at full term.

Abortion is generally spoken of as *threatened*, when the general symptoms are slight, the hæmorrhage scanty, the os undilated, and the membranes unruptured; *inevitable*, when uterine contractions are obvious, hæmorrhage profuse, and dilation of the cervix sufficient to admit the finger has occurred; *complete*, when the whole ovum has been expelled; and *incomplete*, when some portion, usually a portion of the placenta, has been retained.

PROPHYLAXIS OF ABORTION AND DEATH OF THE FÆTUS.

During the whole period of pregnancy a patient who is known to have a tendency to abortion should lead a quiet and regular life, and should devote herself entirely to ensuring the normal continuance of gestation. The diet should be light, nutritious, and the plainer

the better. Articles of food known to disagree and to give rise to indigestion should be avoided. Alcohol is generally unnecessary, but if the patient is accustomed to its use it is better not to withhold it. An extra amount of fluid, preferably in the form of water, is necessary to provide for the extra call on the system and also to counteract constipation. Violent exercise of any kind is to be avoided. Gentle walking exercise may usually be allowed. Driving in a well-sprung carriage is permissible, but fatiguing railway travelling and the jolting of a motor 'bus is decidedly harmful. Nothing is more calculated to induce a miscarriage than the combination of the physical discomfort and the mental fatigue incident to fast automobile travelling. Regular hours for rest should be enforced, and as abortion is most prone to occur at those dates when menstruation would have occurred if the patient had not been pregnant, it is advisable that she should remain in bed during these periods. The administration of bromides at these times is also advisable.

In those cases in which repeated abortion occurs without any discoverable cause it may be necessary to confine the patient to bed during the whole of pregnancy. Cold bathing should not be permitted. A daily warm bath is advisable, and, if desired, this may be followed by a tepid sponge. Coitus should be forbidden from the commencement of pregnancy.

Unless there is some marked indication, such as a purulent discharge, the vagina should not be douched, as the stimulus to the cervix may excite uterine contractions. There is no doubt that one abortion predisposes to its repetition in a subsequent pregnancy, and among the causes of miscarriage great prominence has been given to the so-called "habit of aborting," a condition in which the uterus acquires a habit of expelling its contents usually in the early months of pregnancy. In all probability the greater number of these cases are due to some undiscovered, and consequently untreated, abnormality which acts harmfully in repeated pregnancies, thus giving rise to abortion.

A careful and systematic examination must therefore be made to discover whether any abnormality tending to produce abortion exists. Conditions giving rise to sudden increase of intra-abdominal pressure, such as coughing, vomiting, constipation and consequent straining at stool, should receive appropriate treatment. Violent purgatives, especially aloes, should in all cases be avoided, as the congestion of the pelvic viscera and tenesmus resulting from their use is extremely likely to set up uterine action. Simple enemata may be used with safety, but glycerine or

turpentine are harmful. The urine should be examined for albumen and sugar and the excretion of urea estimated. Evidence of lead poisoning should always be sought for, especially in localities where plumbism is prevalent. In chronic cases the symptoms are usually well marked; on the other hand, the acute cases may only show the faintest trace of a lead line on the gums, but constipation and intestinal colic are almost always present. The treatment consists in free purgation with salines and the administration of potassium iodide. Of recent years the use of the plaster mass of the official *emplastrum plumbi* has largely been employed as an abortifacient, especially in the manufacturing towns in the North of England. This substance resembles wax or cocoa butter in appearance, and readily answers to any of the tests for lead. The patient usually rolls the mass into roughly shaped pills about the size of a large pea.

When once the symptoms of lead poisoning are marked, abortion is usually inevitable. It is said that plumbism in the husband will give rise to the death of the fœtus and abortion. Whether this is so or not, signs of plumbism should always be sought for, and, if present, should receive appropriate treatment.

Having excluded the presence of any general condition likely to have been the cause of miscarriage, *the pelvis should be carefully examined*. If the patient is pregnant, the hands should be sterilised, or, preferably, a sterilised rubber glove should be worn, and the vulva cleansed and swabbed with an antiseptic solution. The examination must be conducted with the utmost gentleness, and if the patient is nervous and excited it is well to defer it until another visit. It should be borne in mind that if abortion occurs after an examination has been made, the medical man will inevitably be held responsible. If the woman is pregnant, it is obvious that disease of the uterus other than malposition is beyond the reach of treatment for the time being. Prolapse or retroversion are best treated by the insertion of a soft ring pessary, which may be worn for the first four months. A daily douche of a mild antiseptic solution, at a temperature of 100° F., given slowly and without force, should be employed as long as the ring is *in situ*. The indiscriminate use of pessaries during pregnancy is not to be recommended. A certain amount of irritation is always set up, the vagina never remains aseptic, and the necessary douching may cause abortion. If pregnancy has not occurred, any abnormality of the uterus, such as subinvolution, or endometritis, should receive appropriate treatment. In some cases lacerations of the cervix appear to give rise to expulsion of the uterine

contents, and good results have in some cases followed the operation of trachelorrhaphy.

After the suitable treatment of any morbid condition of the uterus it is well to forbid coitus, in order that the uterus may have complete rest for at least five or six months.

If displacements of the uterus, endometritis and kidney disease can be excluded, there must always be a strong suspicion that repeated miscarriages and death of the foetus may be due to *syphilis*, and the patient should be treated accordingly. In the absence of history of syphilis in either the husband or wife it is best to have the blood examined by the Wassermann reaction. This test should be made before commencing treatment, as it disappears in a few weeks when the patient is under efficient anti-syphilitic treatment. Should the patient not be pregnant, treatment by the administration of a grain of grey powder thrice daily is sufficient, but if the patient is actually pregnant when first seen it is essential, if the child is to be saved, that she should be rapidly got under the influence of mercury by inunction of mercurial ointment or intra-muscular injection of Lambkin's cream, or some other preparation of mercury. It is, as yet, too early to speak definitely as to the results of the drug "606" in these cases.

THREATENED ABORTION.

It is generally impossible to say whether the foetus is alive or dead; therefore cases of threatened abortion should be treated as if it was alive and an endeavour made to control uterine contractions and to check hæmorrhage. The patient should be put to bed and kept perfectly quiet until some days after all symptoms have disappeared. She should be absolutely recumbent, and the use of the bed pan for both defæcation and micturition insisted on. If any malposition of the uterus exists, it should be rectified and a suitable pessary inserted. All manipulations and examinations must be carried out with the utmost care and gentleness. Morphia may be given as a sedative to the uterus after reposition of the pregnant uterus.

It is hardly necessary to add that full antiseptic precautions are to be adopted.

The bowels should be relieved by the aid of mild laxatives or the use of simple enemata.

Mental quiet is quite as necessary as physical rest. Anything calculated to produce nervous excitement, such as household worries or the presence of visitors, etc., is to be forbidden.

Of the numerous drugs which from time to time have been

vaunted as having a direct controlling action on the uterus none are reliable, many are absolutely useless, and some are harmful. No drug is so satisfactory as opium, and treatment should be commenced by the administration of a full dose of the tincture; its effect should be carefully watched, and it should be repeated as its action passes off. If there is any contra-indication to its administration by the mouth, a morphia suppository can be given. In those cases in which there is marked nervous excitement, bromides should always be combined with the opium. Occasionally, stypsol (a derivative of opium) appears to act well. In cases in which there is a continuous slight loss of blood, calcium chloride may be given; it acts by increasing the coagulability of the blood. It should be given in 15-gr. doses three times a day for two or three days at a time. This drug has an extremely unpleasant taste, and therefore the lactate, which is more stable and also tasteless, is usually prescribed. Small doses of ergot are occasionally beneficial. The object of the administration of ergot is to induce sufficient uterine contraction to control hæmorrhage. It must, however, be given cautiously, otherwise strong expulsive contractions may be set up. The liquid extract of *viburnum prunifolium*, in $\frac{1}{2}$ -drachm doses, is said to exert a controlling influence on uterine action.

INEVITABLE ABORTION.

In cases of inevitable abortion the main indications are in all cases the same, viz., to control hæmorrhage, to secure the complete removal of the uterine contents and to prevent infection. (For the general treatment of collapse and hæmorrhage *see* Post-partum Hæmorrhage.)

The treatment differs somewhat according to the period of pregnancy at which the abortion occurs. As a rule, it is better to employ the curette during the first twelve weeks and at later periods to detach the placenta with the fingers.

If the patient is obviously septic, the curette should not be used, as the infection is almost certain to be generalised owing to the opening up of deeper layers of uterine tissue. In septic cases the cervix should be dilated under anæsthesia with Hegar's dilators sufficiently to admit two fingers, the uterine cavity should be explored and the ovum detached. The fragments of decidua and ovum may now be washed away by means of an antiseptic intra-uterine douche. Having made certain that nothing remains, the interior of the uterus should be swabbed with tincture of iodine. (For the after-treatment *see* Puerperal Infection, p. 313.)

An abortion occurring during the first twelve weeks should be treated on the following lines:

If the hæmorrhage is very severe, the vagina may be packed as a temporary measure to check the loss of blood previous to operation. The bladder and rectum should be emptied. If possible, the patient should be anæsthetised and placed in the lithotomy position. The vulva and vagina are then thoroughly cleansed and rendered aseptic with soap and water, followed by the liberal use of a 1 in 2,000 solution of perchloride of mercury. A Sims' speculum having been introduced and the cervix displayed, the end of a roll of gauze $2\frac{1}{2}$ inches wide, is carried up into the cervical canal as far as can easily be reached, the fornices are then filled, and finally the whole vagina is tightly packed, and a pad secured by a T-bandage is applied to the vulva. The material used for packing is not of much importance as long as it has been sterilised. An antiseptic gauze is best, preferably that impregnated with bismuth oxynitrate or iodoform.

It frequently happens that when the vagina has been packed for some hours, on removal of the plug the whole ovum is found already expelled. If this has occurred, no further operative treatment is required, but if there is any doubt that part has been retained, the uterine cavity should be explored. *Curettage of the uterus in the treatment of abortion* is not an operation to be lightly undertaken; in addition to the risks of sepsis, the softened uterine tissue may easily be perforated either with the dilator or curette. The operation is carried out as follows: An anæsthetic should always be given; the vagina and vulva having been sterilised, and the patient placed in the lithotomy position as described above, and a speculum introduced, the anterior lip of the cervix is seized in a volsellum and drawn well down. By means of Hegar's dilators the cervix is now dilated up to the size of the forefinger and the uterine cavity carefully curetted. The usual sharp curette may be employed, but a better form is the flushing curette, by means of which the decidua is washed away as soon as detached.

If this instrument is not obtainable, after curettage the uterus should be freely douched through an intra-uterine tube, and the cavity swabbed out with tincture of iodine. If the hæmorrhage is troublesome, the temperature of the douche should be increased to 118°F. and a hypodermic of Parke Davis' aseptic ergot administered. If these means do not serve to control the loss of blood, the uterine cavity should be packed with gauze, care being taken that the gauze is carried well up to the fundus and that the whole cavity is packed. The gauze should be removed in twelve hours' time.

ABORTION OCCURRING LATER THAN THE FIRST TWELVE WEEKS.

The treatment of abortion occurring later in pregnancy depends upon the degree of dilatation of the os, the amount of hæmorrhage and the occurrence of pain. If the uterus is contracting well, the os dilating, and there is no undue hæmorrhage, it is best at first to employ purely expectant treatment; later, if the ovum has not been expelled when the os is well dilated, the cavity of the uterus should be explored and the contents removed. The main difficulties to be contended with are, that the placenta may be situated high up and only reached with difficulty, and that it may be adherent. The body of the fœtus may be expelled, but the head retained, either attached to the trunk or entirely separated; in either case the cervix is apt to be tightly contracted around the neck. The fœtus may be macerated and come away piecemeal. The cervix is occasionally very rigid, and may oppose the introduction of the finger. This is especially marked if ergot has been given.

If it has been decided to explore the uterine cavity, the preliminary steps as to asepsis described above should be carried out. An anæsthetic is always necessary. One hand should be passed into the vagina and two fingers into the uterus, while the other hand makes counter-pressure on the fundus of the uterus. A grasp of the fœtus is obtained, and if possible it is withdrawn. The placenta is now sought for and peeled away from the uterine wall and removed.

In those cases in which the body of the fœtus is expelled into the vagina, and the head retained in the uterus care must be taken not to detach it from the trunk by excessive traction. A pair of ovum forceps should be passed up alongside the neck and over the head. If a good grasp is obtained, the head can usually be withdrawn. A useful instrument for this purpose when dealing with fœtuses of about four to five months is the forceps used for the introduction of Champetier de Ribes' bag. The blades are introduced on either side of the head, and when closed act as a minute cephalotribe, and the flattened head can easily be removed.

After removal of the ovum, it is important that the whole interior of the uterus should be explored, as the retention of any mass of adherent placenta will inevitably give rise to subinvolution, continued hæmorrhage and possibly sepsis. Finally, the uterine cavity should be washed out through an intra-uterine tube with at least one quart of weak antiseptic solution, such as perchloride of mercury (1 in 7,000).

At later periods of pregnancy cases of abortion are usually

easier to manage, uterine contractions are generally much more marked, and the process resembles ordinary parturition. If the pains are efficient and the cervix is dilated, in the absence of any contra-indication, such as hæmorrhage, the case should be left to nature. If the membranes are ruptured, and the cervix will admit three fingers, the process may be shortened by version. The leg may be brought down and a piece of tape tied to it by means of which traction can occasionally be made. The greatest obstacle to delivery is contraction of the cervix around the neck; this usually results from too vigorous traction on the body, the cervix not having had time to dilate; if this happens, the head should be perforated either with a perforator or a sharp pointed pair of scissors; the skull will then collapse and pass without difficulty. If the placenta cannot be expressed, it should be removed manually. It is advisable in all cases in which there have been repeated and possibly prolonged intra-uterine manipulations to wash out the cavity of the uterus with an antiseptic lotion.

INCOMPLETE ABORTION.

The symptoms of incomplete abortion are pain, more or less continuous hæmorrhage, sub-involution of the uterus and patency of the cervical canal. If decomposition of the retained products of conception has occurred, the discharge will be offensive and there will be the usual symptoms of septic poisoning.

Cases of incomplete abortion may be divided into two classes: those requiring immediate treatment, and those in which it is safe to temporise. The main indications pointing to the immediate necessity for exploration of the uterus are excessive hæmorrhage or the onset of symptoms of septicæmia or septic absorption. It is unnecessary to describe in detail the operative methods to be employed, as they differ in no particular from those described under the heading of Abortion.

If it has been decided to temporise, the patient should be kept in bed, the diet should be light and the bowels thoroughly opened. Ergot should be administered with a view of inducing uterine contractions and the expulsion of the retained products of conception. The utmost care should be taken to maintain asepsis. The external genitals should be cleansed in exactly the same manner as in a normal confinement, and an antiseptic pad should be applied to the vulva. The vagina should be douched with hot antiseptic lotion at least twice a day with a view not only of asepsis, but also to promote contraction of the uterus and involution.

MISSED ABORTION.

By "missed abortion" is meant a condition in which the ovum dies and is retained in the uterus indefinitely, in some cases for months and even years after its death.

As a rule, the patient has the usual symptoms of a threatened abortion. After a time these cease, and pregnancy apparently continues normally, but the abdomen does not enlarge. As soon as the diagnosis is certain, the cervix should be dilated and the ovum removed as described above.

AFTER-TREATMENT OF ABORTION.

As a rule, most women treat an abortion or miscarriage far too lightly. Nothing is more likely to give rise to chronic pelvic disease and years of untold pain and misery than the neglect of suitable treatment during the puerperium. Septic abortions especially are dangerous, and are a fertile source of cases of pelvic disease treated by the gynæcologist.

The after-treatment of abortion is of the greatest importance, for involution of the uterus is less active than after parturition at full term. Treatment is exactly comparable with the ordinary routine treatment during the puerperal period after delivery at term.

The patient should remain in bed for at least fourteen days. The bowels should be relieved within the first forty-eight hours. The necessity for maintaining the cleanliness of genitals is just as great in abortion as after delivery at full term, and is carried out in precisely the same manner. A vaginal douche is unnecessary, unless the lochia is offensive or unless there are symptoms of sepsis.

A. LIONEL SMITH.

ACCIDENTAL HÆMORRHAGE.

THIS form of bleeding is due to the premature separation of a normally situated placenta. Treatment is required in the majority of cases, but there is a wide difference in urgency between the mildest examples and the severe ones.

The bleeding may be so small in amount as to cause no symptoms, and not even to be recognised as having happened at all till the placental stage of labour arrives; and if hæmorrhage occurs while the uterus is active, the pressure of the uterus on the ovum is enough to check the loss from few and small vessels.

Speaking generally, bleeding of any importance cannot be arrested as long as the uterus contains the ovum, since retraction sufficient to compress the torn vessels cannot be maintained. Retraction depends on the activity of the uterine muscle. The prognosis for the mother, in any but the slighter cases, thus depends on (1) the activity of the uterus and (2) not long-delayed delivery, spontaneous or artificial.

The prognosis for the child is bad in severe external cases, and in all those of the concealed variety; but in the slighter bleeding of the external kind the danger to its life is small.

Concealed accidental hæmorrhage is far more dangerous than the external variety, owing to the fact that in practically all cases the blood is retained because the *uterus is inert* to start with; and, further, because distension of the uterus to any considerable degree paralyses its muscle. By over-distension of the uterus shock is produced or increased, and this in its turn maintains and accentuates the uterine inertia. More and more of the placenta is separated by the retained blood and the child dies.

The aim, in all cases where treatment is necessary, is to relieve shock if this is present, make the uterus contract, and empty the uterus as rapidly as is consistent with safety.

The measures at our disposal are: (1) Rest and sedatives; (2) plugging the vagina; (3) perforation of the membranes; (4) the use of a dilating bag; (5) Cæsarean section, simple or with hysterectomy; (6) the use of Bossi's or other mechanical rapid dilators; (7) vaginal hysterotomy; (8) the use of full doses of morphia and the general relief of shock.

The mode of action of each method of treatment may be now briefly summarised.

(1) **Rest and Sedatives.**—By treatment of this kind it is often possible (*a*) to steady an excited uterus so as to allow the extravasated blood to clot, and to prevent any further detachment of the placenta; and (*b*) to act in a similar way on the general circulation, and so diminish the tendency to bleeding. A good result is to be expected in slight cases only. The patient must be kept rigidly in bed, be very lightly dieted, and have subcutaneous injections of morphia in medium doses, repeated as often as is necessary. Very small doses of ergot (5 to 10 min. of the liquid extract or the equivalent of this) are often useful in steadying the uterus. Various other drugs, such as *viburnum prunifolium*, are recommended for the same purpose.

(2) **Plugging the Vagina.**—The object of this is not to dam the stream of blood at the os uteri (which is one part of the action of a plug on the small uterus of an early abortion), since such a result would be most undesirable in the cases under consideration, but to *stimulate the uterus*. The contractions thus produced will cause pressure on the ovum and tend to close the bleeding vessels, and will also expel the uterine contents. Plugging the vagina is appropriate in cases where the cervix is undilated and the membranes are intact, and only where the bleeding is mainly external; for in the concealed kind the uterus is quite inert, and valuable time would be lost in trying to make it contract. It must, however, be added here that a series of very successful cases treated by the plug, including some of concealed hæmorrhage, has been published by Colclough.¹ He believes that the plug, combined with the counter-pressure of a tight abdominal binder, so compresses the uterus as to arrest the bleeding mechanically.

It is essential, if it is used at all, that the plugging be properly done; for if it is not, time is wasted, the woman is further exhausted, and there is the added risk which all manipulations bring. The external parts and the vagina must be made as aseptic as possible. A strip of sterilised gauze or other convenient material of about 4 inches wide and 4 or 5 yards long, soaked in a dilute antiseptic, is the best substance to employ.

The fornices should be made accessible by a Sims' speculum, and very tightly filled with the gauze, and then each successive portion of this as the vagina is filled must be firmly pressed home. If more than one length is required, a fresh strip can be knotted on to the first. A T-bandage should be applied over the lower end of the plug and a tight abdominal binder adjusted. Plugging done in this way causes much discomfort, and a small dose of morphia is as a rule necessary. The catheter will have to be used as long as the

plug is retained. At the end of twelve hours the gauze may be removed, and if necessary renewed.

(3) **Perforation of the Membranes.**—Diminution of the intra-uterine pressure, and contact of the fœtus with the uterine wall caused by letting off some of the liquor amnii usually stimulates the uterus. If, therefore, the uterine muscle is not originally inert or paralysed by the distension of concealed bleeding, puncture is a valuable resource. It may be employed after contractions have been induced by plugging. Unless the membranes are tense, and the bag projects somewhat from the external os, it may be difficult to perforate them. The simplest way is to introduce a single volsellum into the cervix, open it as widely as the walls of the cervix will allow, and by closing it while it is slightly pressed upwards, seize a fold of the membranes and tear this through.

(4) **The Use of a Dilating Bag.**—The best bag for this purpose is that of Champetier de Ribes. This should have a basal diameter of $3\frac{1}{2}$ inches, and a capacity of 17 fluid ounces.

Its effect is (a) to stimulate the uterus (and it is the most efficient agent for this purpose); and (b) to dilate the cervix mechanically to a degree sufficient to allow the head to pass. It can be used in cases where the bleeding is free directly the os is dilated enough to admit it. Its dilating action can be reinforced by manual traction, or by attaching to it by means of a tape a weight of about 2 lb., and hanging this over the edge of the bed.

The bag must be sterilised before it is used, and it is filled through a tube and funnel with 17 oz. of a weak antiseptic solution. Its effect must be carefully watched, and if no contraction is produced in a quarter of an hour or so, or sooner if the bleeding is very severe, recourse must at once be had to other means of delivery.

(5) **Cæsarean Section, Simple, or with Hysterectomy.**—By the rapid removal of the ovum from the uterus this organ is given an opportunity to contract, with or without further stimulation. If after delivery of the fœtus and placenta contraction cannot be induced, the persisting bleeding can be at once arrested by extirpating the body of the uterus, and this will do away with the risk, often great in these cases, of post-partum hæmorrhage.

The operation no doubt increases the already existing shock, but much less harm may be done in this way than by attempts to empty the uterus by the natural route. Some experience in abdominal surgery is necessary to the medical man who employs it, and it may therefore not be advisable in circumstances where if skilfully done it would be the most promising form of treatment, and would make the patient safe, supposing she survives the additional shock.

In hospital practice Cæsarean section, with or without hysterectomy, is most satisfactory in such cases as are suitable for it.

(6) **The Use of Bossi's Dilator.**—There is a considerable amount of danger in the employment of this instrument, or of any other forcible means for rapidly dilating the cervix. This is due to the undirected and uncontrollable laceration of the lower orifice of the uterus and of the parts around which is liable to occur. It may be, however, the only means available. In the cases in which rapid forced dilatation might have to be used the shock would necessarily be increased by the tearing and additional bleeding it almost inevitably causes, far more than by a clean cutting operation where the blood loss is also under control; and it takes a longer time to empty the uterus by this method than by a Cæsarean section. Finally, when the uterus has been emptied by forced dilatation and rapid extraction, it is almost certain to remain inert and allow the bleeding to go on; there is no safeguard against post-partum hæmorrhage, and the lacerated wounds produced are liable to septic infection.

(7) **Vaginal Hysterotomy.**—This operation is recommended by some authorities in cases where Cæsarean section is applicable. It can be employed safely only when the cervix is obliterated and has become part of the lower uterine segment. Laceration beyond the actual incision will almost certainly occur in any case during extraction, and if the cervix is not yet taken up the risk of opening large vessels in this way is greatly increased. Abdominal section is therefore much safer.

(8) **The Use of Full Doses of Morphia and the Treatment of Shock.**—In cases of concealed hæmorrhage, where there is much shock, an attempt may be made to relieve the shock by the following method: Morphia ($\frac{1}{2}$ gr.) is given hypodermically at once, and two doses of $\frac{1}{4}$ gr. at half-hour intervals. The head is lowered and the foot of the bed raised. The warmth of the body is maintained by the external application of heat, a pint or two of saline solution is given per rectum, and strychnine ($\frac{1}{50}$ gr.), is injected hypodermically once or twice, as may be necessary. When the shock is relieved, the cervix may be dilated and the ovum delivered through it, or the abdominal route may be chosen. This method has been used with success in several instances, and it is worth while employing it when circumstances are unfavourable for Cæsarean section at once or later on.

CASES OCCURRING BEFORE LABOUR HAS BEGUN.

Slight External Hæmorrhage.—Here we have to deal with what is practically a threatened abortion or premature labour,

according as the bleeding happens in the earlier or the later months of pregnancy. Rest and sedatives are to be employed. If they are successful the rest should be maintained for three or four days. If the bleeding still goes on, the case must be treated like those of severe external hæmorrhage.

Under all circumstances *the cause of the bleeding must be investigated*, and any existing disease of the circulatory, urinary or other system, likely to lead to hæmorrhage, treated.

Slight Concealed Hæmorrhage.—Such a condition will probably not be diagnosed before labour, since there will be no marked symptoms.

Slight Mixed External and Concealed.—These cases are to be treated as those of slight external hæmorrhage.

Severe External Hæmorrhage.—In this condition the object of the treatment is to start labour. This is best done by plugging the vagina and the application of a firm binder. After the plug has been in position for twelve hours it must be removed, when pains will probably have appeared and the bleeding may have ceased. If this is so, all that is needed is to watch the course of labour and assist it if necessary. If the bleeding is still free, the membranes should be perforated. Care must be taken that at least 4 or 5 oz. of liquor amnii escape, and if necessary, the foetal head must be pushed up slightly so as to allow this to happen. If the case is still urgent, a de Ribes' bag should be inserted. There will usually be no difficulty about this, for if, as is understood, the uterus is active, the cervix will be dilated enough to allow of the introduction of the bag. The uterus should be further stimulated, if necessary, by external friction and kneading.

If, however, after removal of the plug the uterus is still inactive, the same practice as just described should be followed, the cervix being dilated if necessary by Hegar's dilators till it will admit the bag. This will mean dilatation up to No. 24 or 26 of Hegar's scale. It is better to do this than to re-plug the vagina, for the evacuation is thus advanced more rapidly. Further, the persistence of inactivity after plugging is strongly suggestive of retention of some of the effused blood, that is, of concealed hæmorrhage. The presence of shock would tend strongly to confirm this, and a careful examination per abdomen should be made of the uterus to settle the question.

If without any sign of blood being retained there is some degree of shock, very great care must be taken not to deliver the woman too rapidly by the forceps or any other means chosen, for rapid emptying of the uterus will increase the shock, and may thus cause

the patient's death, to say nothing of its rendering post-partum hæmorrhage very probable. When the signs of shock are at all marked and delivery cannot be soon accomplished, it is best to perform Cæsarean section, if this can be done.

Severe Concealed Hæmorrhage.—In this case the woman will be suffering from shock, which must on no account be increased unnecessarily, and the uterus will be inert. Attempts at delivery by dilatation of the cervix are at this moment out of the question. The best course is to do Cæsarean section.

If, however, this is not possible for any reason, or if the medical man does not feel equal to doing it, the plan of giving full doses of morphia and trying to relieve the shock may be tried.

It has been mentioned in the description of plugging the vagina, that there have been a certain number of cases successfully dealt with by this means, so it would be quite legitimate to employ it if Cæsarean section is not feasible; and it would no doubt be well to combine it with the last-named method.

Severe Mixed Hæmorrhage.—When the bleeding is both external and concealed, the treatment will depend roughly on the relative proportions of each, and the amount of shock will be the guide to procedure, as set forth in the above paragraphs.

In all cases saline infusion must be early performed and repeated as often as required.

CASES OCCURRING AFTER LABOUR HAS BEGUN.

Slight External Hæmorrhage.—In this case it is best to puncture the membranes and thus stimulate the uterus to greater activity. If there is any difficulty, a single volsellum may be used, as already described. When the bleeding still persists, a de Ribes' bag should be inserted, and if there is not room to get this in, the cervix must be dilated as far as is necessary with Hegar's dilators.

Concealed and Mixed Hæmorrhage.—It is unnecessary to consider these conditions at length. Slight concealed bleeding with an active uterus will hardly ever be diagnosed, and it is of little importance; and the mixed form must be treated exactly as the external kind.

Severe External Hæmorrhage.—The treatment here is as for slight cases.

Concealed and Mixed Hæmorrhage.—If the bleeding is entirely concealed, a state of things which could hardly exist, as will be already understood, with an active uterus, the case must be treated as if labour had not yet begun. It might be preferred by some to do vaginal hysterotomy under these circumstances instead of Cæsarean section, and it would be proper to perform

it as soon as the cervix is taken up. The abdominal operation is the safer in any case for the reasons already given.

In addition to the various forms of treatment just described, which are mainly mechanical, oxytoxic drugs should be employed. The best of them in these cases is *quinine*, since it has the effect of increasing the frequency and force of uterine contractions, whereas ergot and its preparations tend to produce a tonic state of the uterine muscle, and this is not so useful nor so safe when a rapid evacuation is needed.

When the uterus is contracting regularly and it is desired to hasten labour, the forceps should be used on full dilatation of the os, whether brought about naturally or by the use of de Ribes' bag. Before full dilatation, if rapid delivery is necessary, bi-polar version is the right treatment. When the half-breech fills the os, it will both hasten the dilatation of the cervix and still further stimulate the uterus. If the child is dead, its head may be perforated to allow of delivery being hastened.

Shortness of Cord.—In the very rare instances where the premature detachment of the placenta is due to shortness of the cord, the cord must be ligatured and divided as soon as the child is sufficiently born to be able to breathe.

Post-partum Hæmorrhage.—In all cases where there has been great loss of blood, the patient must be carefully watched for some hours after labour is completed, since she is liable to post-partum hæmorrhage. If the uterus shows signs of continued relaxation and there is more oozing than there should be, a douche at 118° F. must be given, and ergot and general stimulants employed, with, of course, renewed saline infusion.

EPITOME OF TREATMENT OF ACCIDENTAL HÆMORRHAGE.

Mild Cases.—Rest and sedatives. If not successful, or if labour has begun, treat as severe.

Severe Cases.—If the uterus is not contracting: (1) try to make it do so and assist delivery, if necessary; (2) relieve shock; (3) if neither is possible, do Cæsarean section.

If the uterus is contracting: (1) Perforate the membranes; (2) dilate the cervix; (3) assist delivery, if necessary. Watch for post-partum hæmorrhage.

W. R. DAKIN.

REFERENCE.

- ¹ Colclough, W. F., Journ. Obstet. and Gynæcol. of the Brit. Empire, London, 1902, II., p. 153.

ALBUMINURIA.

ALBUMIN is found in the urine of pregnant women with a frequency which has been variously estimated at from 3 to 20 per cent.

The albuminuria associated with eclampsia, in which there is usually a large amount of albumin present, is practically confined to the latter half of pregnancy, cases of eclampsia at an early date being very rare. A small amount of albumin may be found in the urine in the early months, and it will then frequently be found that the patient is the subject of chronic Bright's disease. If this is the case, she is liable to suffer from severe vomiting and from albuminuric retinitis. Pronounced albuminuria in the later months is a dangerous complication for both mother and child. The danger of this condition is greatly increased by the fact that it is so often unrecognised and untreated, until the sudden onset of a convulsion draws attention to the case. It should be made a rule to examine the urine of every pregnant woman; the first examination should be made as early in the pregnancy as the woman is first seen, and the examination repeated at intervals of a month. As full term approaches the intervals should not be longer than a fortnight; if this rule were strictly adhered to, the death rate from puerperal eclampsia would be greatly reduced.

It should always be borne in mind that a haze of albumin in the urine may be due to admixture with vaginal discharge, so that, if albumin is present in the specimen passed by the patient, we should never base a diagnosis or treatment on that, but should examine a catheter specimen. If, on the other hand, there is no albumin in the specimen voided by the patient, it will not be necessary to pass a catheter.

If albumin is found, a microscopical examination of the deposit, obtained by allowing the urine to stand, or better by using a centrifugaliser, should be made. The presence of blood or epithelial casts increases the gravity of the prognosis. A distinct cloud of albumin may be due to a cystitis or pyelitis, which will be revealed by the presence of pus cells and bladder epithelium under the microscope.

The amount of urine passed and the percentage of urea should be ascertained; the specific gravity is also important. With a diminished secretion of urine a low specific gravity is said to be of worse prognostic import than a high one, as indicating a smaller

excretion of urinary salts and solid matter. The occurrence of severe headache or of any œdema of face, feet or genitals, in the latter months of pregnancy, should suggest an immediate examination of the urine, if this has not already been done.

Treatment of Albuminuria.—If a small amount of albumin is found in the earlier months, it will be necessary to treat the patient on the lines of a case of chronic Bright's disease.

The diet should be mainly non-nitrogenous, very little or no meat being allowed, and no substances containing extractives, such as meat extracts, meat soups, or beef-tea. The food should be mainly milk and fruit, with farinaceous foods in moderation. The patient should be allowed to drink large quantities of water or of Imperial drink. The latter is made as follows: one drachm of acid tartrate of potash and the juice of half a lemon to 1 pint of boiling water, sweetened to taste.

The patient need not be confined to bed; she should be encouraged to take gentle exercise, but should be warned against the danger of over-exertion and of chill.

The clothing should be woollen but should be loosely woven, or cellular clothing of wool or cotton may be worn. Alcohol should be forbidden.

A daily warm bath, preferably at bedtime, and followed by friction, is beneficial. Cold baths should be avoided.

A saline aperient, such as sulphate of soda or one of the aperient mineral waters, will probably be required, and an occasional dose of calomel is beneficial.

Diuretic drugs may be given, the alkaline diuretics being the most suitable. The following is a good prescription: *R. Potassii Citratis*, gr. 15; *Potassii Acetatis*, gr. 20; *Liq. Ammon. Acetat.*, ʒj; *Aq. Chlorof.*, ad ʒj; [*U.S.P. Potassii Citratis*, gr. 15; *Potassii Acetatis*, gr. 20; *Liq. Ammon. Acetat.*, ʒj; *Aq. Chlorof.*, ʒss; *Aquam*, ad ʒj]; *quarta quaque hora*.

It is very seldom necessary to induce abortion in these cases, as, if the treatment above outlined is thoroughly carried out, the albuminuria will diminish and the patient improve. If, however, the amount of albumin steadily increases and the amount of urine and percentage of urea decrease in spite of treatment, it may be necessary to induce abortion. The complications already mentioned, viz., excessive vomiting and albuminuric retinitis, may call for evacuation of the uterus.

The cases in which albumin is found for the first time in the later months of pregnancy are so different as to merit being placed in a separate category from those we have been considering; in

these cases the albumin appears suddenly or rapidly, and is usually very considerable in amount, the amount of urine is much diminished, and blood and casts are often present. In many cases œdema is a marked symptom. In cases of this kind eclampsia is always to be feared, and is particularly liable to occur in those cases in which the condition has not been recognised at its onset, but has persisted for some time untreated.

Statistics show that this disease is much more likely to occur in primiparæ, and in the experience of the writer it has seemed that its occurrence was most to be feared in well-developed women who had been in the habit of taking a large amount of exercise and eating much solid food.

When albumin is found in considerable quantity in the urine in the later months, the case should be taken in hand at once.

In the first place, the patient must be confined strictly to bed, and it is a very good plan to commence the treatment by allowing nothing whatever but water for the first forty-eight hours. This may be given freely, or if the patient prefers, Imperial drink may take its place.

Afterwards milk well diluted may be given, and the diet should be limited to that until there is distinct improvement in the secretory function of the kidneys.

The next point in the treatment is to secure free watery evacuations of the bowels, for which purpose a dose of 20 to 30 gr. of pulv. jalapæ co. may be given, or sulphate of soda, 1 drachm in 2 oz. of water, every two hours till the effect is produced.

A diuretic should be given similar to the one already prescribed for albuminuria in the earlier months.

Rectal injections of saline solution may be given after the bowels have been well emptied by the above purgatives, assisted if necessary by an aperient enema. If the patient has difficulty in swallowing the requisite quantity of fluid or rejects it when given per rectum, subcutaneous infusion of 1 pint of normal saline solution may be administered once or twice daily. In one case with marked dropsy the writer saw a very good effect produced by the administration of theocin sodium acetate in 5-gr. doses in 1 oz. of water every four hours.

Thyroid extract in 5-gr. doses, given until symptoms of thyroidism (rise in the pulse rate, increased warmth of the skin, perspiration and diuresis) are produced, has been highly spoken of by Nicholson and other observers.

Much has been written about the advantages of salt-free diet in cases of albuminuria, particularly when dropsy is a prominent

symptom, and Dr. Aldren Turner has shown that when this diet is taken in cases of epilepsy much smaller doses of bromide are required to control the fits; this may suggest the advisability of substituting sodium bicarbonate for the sodium chloride in the saline solution.

Sweating should be encouraged by vapour or hot air baths, the latter being preferable. Some doubt the efficacy of sweating; it is certainly well, if measures are taken to procure it, that a large amount of fluid should be given at the same time, either by mouth or by rectum or subcutaneously.

A good way of applying hot air is to roll the patient in a blanket, and place her in a simple hot air chamber, made by placing cradles on the bed and covering them first with blankets, and then with a mackintosh. Hot air from a Bunsen burner may be conducted into the hot air chamber thus made by means of a piece of tube ending in a funnel-shaped expansion over the burner; the heat may be applied for twenty minutes at a time.

In a case of this kind the most frequent prodromal symptom of eclampsia is severe and persistent headache. Other prodromata are increased pulse tension, disturbances of vision, giddiness, noises in the ears, œdema, localised anæsthesia or paralysis (temporary blindness being one of the latter), and severe epigastric pain. If any of these symptoms occur, in addition to the treatment already advised, the following may be given: Potass. Bromid., gr. 20; Chloral Hydrat., gr. 10; Syr. Aurant., ʒj; Aq., ad ʒj; quarta quaque hora.

If the albumin in the urine increases and the amount of the excretion persistently diminishes, if at the same time microscopical examination of the sediment shows advancing renal disease, or if any of the above-mentioned prodromal symptoms of eclampsia are present, the difficult question of induction of premature labour presents itself.

On the whole, the writer is inclined to advise that labour should not be induced unless eclamptic fits have actually occurred, and he has seen some most satisfactory cases in which the treatment already set out has been followed by spontaneous delivery without the occurrence of eclampsia. It is to be remembered in this connection that when the patient is in this state of severe toxæmia premature labour is extremely likely to come on spontaneously, and, on the other hand, any local interference may precipitate a convulsion. Even a digital examination of the vagina has been known to do this.

C. E. PURSLOW.

ECLAMPSIA.

THE practitioner is generally sent for as soon as a fit has occurred, and in many cases it will happen that there will have been no prophylactic treatment, because the patient and her friends have not suspected that anything was wrong until they were alarmed by the occurrence of a fit.

The patient should at once be put to bed in a darkened room and preserved from all external causes of irritation as far as possible.

An efficient nurse should be obtained, and she should be instructed that if another fit comes on the patient should be watched carefully to see that no harm befall her (as by suffocating in the bedclothes or falling out of bed). During the fit a piece of wood should be placed between the teeth to prevent the tongue being badly bitten.

It is a good plan to place one side of the bed against the wall; the nurse can then more easily control the patient. During the coma which follows a fit the head should be brought to the edge of the bed and turned well over on one side, so as to allow saliva to run out and prevent it entering the trachea. The right side is said to be preferable, as when the patient is on that side there is less likelihood of pressure on the heart by the stomach, since in many cases it has been noticed that the attack has followed a meal.

If the patient is able to swallow, she may be given water freely by the mouth, but no other nutriment.

A quickly acting aperient should be given, either calomel (3 gr.) with pulv. jalapæ co. (80 gr.), or croton oil (2 min.) made up with powdered sugar and placed on the tongue. In addition, it is wise to give a copious enema of soap and water, and after this has returned to give slowly a further injection of 4 oz. of water, in which 1 oz. of sulphate of magnesia has been dissolved, and to allow this to remain. If the apparatus is at hand, the stomach may also be washed out, using a simple syphon tube, and the sulphate of magnesia solution as above may be introduced into the stomach instead of into the rectum, or 2 min. of croton oil in 1 oz. of castor oil may be left in the stomach.

The next step is to give a sedative, and the writer prefers the following: Potassii Bromidi, gr. 40; Chloral Hydratis, gr. 20; Aq. ad ʒj; repeated every two hours for three doses. If the patient is

unable to swallow, twice this dose may be given as an enema repeated two or three times. It should be introduced slowly into the rectum, using a funnel and a long rectal tube or large-sized catheter, not a Higginson's syringe.

Poultices to the loins are useful and probably encourage action of the kidneys.

Hot air baths may be given, but, as a rule, there is not time for this method of treatment.

One of the greatest improvements in the treatment of eclampsia and one of the few methods upon which almost all authors are agreed is the use of saline intravenous or subcutaneous infusion. The latter is the easier and more usual way of administering it, and requires a very simple apparatus. All that is necessary is a suitable needle, about 3 feet of indiarubber tubing, and a small glass funnel. The site chosen may be the submammary region, the abdominal wall, the flank or the sub-scapular region. A disadvantage of the latter is that, should the puncture wound inflame, it may interfere seriously with the dorsal decubitus and consequently the patient's comfort. The solution used may be 1 drachm of ordinary salt to the pint of water or, better still, 1 drachm each of chloride and acetate of soda to the pint, and 2 pints may be injected at once. It is convenient to carry the salt in small glass containers as supplied by some of the manufacturing chemists; boiled water should be used, if possible.

Horrock's small saline infusion apparatus is one of the best, and some such appliance should be carried in every midwifery bag (*see* p. 222). It is an advantage to have the bifurcated tube with two terminal needles, so that the infusion can be carried on at two places simultaneously. A quicker effect may be obtained by introducing the fluid directly into a vein, one of the veins on the front of the elbow; usually the median basilic is chosen. A bandage is applied above the elbow to make the veins prominent, and an incision is made about 1 inch in length. The vein is freed from the tissues and a double strand of fine silk applied beneath it. An opening is made into the vein and the blunt needle introduced, pointing towards the trunk, care being taken that air does not enter; the needle is fixed in position by tying the silk ligature over it. About one pint is allowed to enter slowly. The needle is then removed, and the vein is tied in two places and divided. A suture is placed in the skin wound, and a simple dressing applied with a bandage.

Before proceeding to consider the question of obstetrical interference it will be well to mention numerous other methods of treatment and to briefly discuss their value:

Chloroform.—As an immediate method of controlling the fits nothing is better than chloroform inhalation, and if any obstetric interference is contemplated, it is absolutely essential that the patient should be placed fully under the influence of chloroform before anything is done. But much may be urged against the common practice of giving chloroform at the onset of each fresh convulsion, when no operative interference is to be carried out. A large amount of chloroform will be required and the system will be saturated with it. It has been found that chloroform itself produces very similar degenerative changes in the liver to those met with in puerperal eclampsia. Again, during the fit the patient is more or less asphyxiated and needs oxygen rather than chloroform. The use of chloroform in this way is therefore, in the writer's opinion, not to be recommended.

Venesection is one of the oldest remedies for eclampsia, and has stood the test of time.

It is an excellent remedy for plethoric women, especially when the pulse is strong and of high tension, and when cyanosis is present; it is also especially applicable to cases in which the fits commence or continue after the child is born. A superficial vein on the bend of the elbow is chosen, usually the median basilic or cephalic, a handkerchief or bandage is tightly applied round the arm above the elbow, and an incision about 1 inch long is made over the vein, the wall of the latter being incised with the scalpel. About 15 to 20 oz. of blood should be withdrawn. If the blood flows slowly, the flow may be encouraged by active or passive movements of the arm. When a sufficient amount of blood has been withdrawn, the skin wound is closed by a suture, and pressure by a pad and bandage applied. If venesection is practised, saline infusion, as already described, should accompany it.

Morphia.—A treatment which has come very largely into vogue of late years, and which is strongly favoured at the Rotunda Hospital, is the subcutaneous injection of morphia. This is commenced at once when convulsions set in, $\frac{1}{2}$ gr. being given as the first dose and subsequent doses of $\frac{1}{4}$ gr. every two hours are given until the patient has had 2 gr. altogether; in Germany as much as $4\frac{1}{2}$ gr. in twenty-four hours has been given.

Some advocate the addition of scopolamine to the morphine on the ground that this drug counteracts the depressant action of the morphine and lessens the tendency of the latter to check the uterine contractions; the dose for subcutaneous injection is $\frac{1}{60}$ to $\frac{1}{100}$ gr.

Codeine in doses of 1 to 2 gr. has also been used.

The writer from his own experience does not favour the morphine treatment.

Thyroid Extract.—As already mentioned, thyroid extract in doses of 5 gr. has been used with very good effect as a prophylactic in cases in which eclampsia threatens. It has also been strongly advocated when eclampsia is present. In this connexion a dose of 30 to 40 gr. is given at first, and a second dose of 20 to 30 gr. in six or eight hours later. It is found to produce vaso-dilatation and to reduce the pulse tension, and it is claimed that it favours metabolism.

Instead of giving thyroid extract by the mouth, liquor thyroidei, in 15 min. doses, has been injected *sub cute*.

Nitro-glycerine, in repeated subcutaneous injections, in doses up to 7 min., has been highly praised by McCarthy, but has not had a very extensive trial.

Veratrum Viride has been used extensively, especially by American and Italian obstetricians, and very good results have been claimed for this drug. It is said to be very efficacious in lowering the rapidity and tension of the pulse, and is particularly indicated when these are high. It is administered subcutaneously in doses of 5 to 7 min. of the liquid extract, repeated frequently every hour or oftener, the pulse rate being taken as an indication of the amount required.

Pilocarpin.—This has been extensively used, mainly with the idea of encouraging sweating; one great objection to it is that it increases bronchial and salivary secretion, and in the case of a comatose patient this may prove a very serious matter. In the writer's opinion this drug should never be used.

Oxygen, by inhalation, has been advised in cases in which cyanosis is a marked symptom, and for this class of case it certainly seems well worth while to use it, if it can be obtained.

Massage of the Heart, when that organ is failing, has also been used.

Cold Baths have been strongly advocated for cases in which marked hyper-pyrexia occurs. This symptom indicates extreme danger, and nothing can be said against its treatment by this method. A temperature running up to 106° F. would indicate this treatment, and the bath should commence at 100° F. and be cooled down by the addition of cold water or ice to 80° F., when the patient should be removed from it and placed in a blanket.

Rectal Injection of Solution of Glucose has been advocated on the ground that by this substance the glycogenic content of the liver is increased and, in consequence, the antitoxic action of that organ is favoured.

Decapsulation of the Kidneys has been strongly advocated, particularly for cases in which the fits have commenced after

delivery; or, in cases in which the secretion of urine is much diminished or arrested. Very conflicting opinions as to the value of this operation prevail, and it cannot be said to have obtained an established position in the treatment of eclampsia.

Lumbar Puncture.—This has been advised, more especially for cases in which coma is a marked symptom, but the results have been disappointing and it cannot be recommended.

Obstetrical Treatment.—We now pass to the obstetrical treatment of cases of eclampsia, and here diametrically opposite opinions prevail. One school, of which Herman is a chief leader, advises that nothing should be done to induce labour or to hasten it, if it is in progress; while the other, of which several of the German obstetricians are the leading exponents, advises the most active methods, including *accouchement forcé*, vaginal and abdominal Cæsarean section; each school brings forward statistics to support its own line of argument.

The writer from his own experience would favour the following main line of treatment of the obstetrical aspect of the case: If labour is in progress he would hasten it, if this can be done without incurring too much risk; thus, if the external os will admit two fingers and the canal of the cervix is well taken up, he advises digital dilatation, to be followed by forceps or version, as seems most suitable. It is very important to recognise this taking up of the cervical canal, which is a certain indication that labour has started. The cervical canal is dilated and becomes a part of the lower uterine segment, and the ovum rests on the thinned-out external os; when this has occurred, dilatation with the fingers can usually be carried out. If there is much difficulty, the cervix can be incised with scissors without incurring any great risk.

If digital dilatation is practised, it is a great advantage to be able to use the fingers of both hands (bi-manual dilatation); to do this, the rim of the cervix is hooked down by the index finger of one hand and the corresponding finger of the other hand is introduced opposite to it; two or more fingers of each hand may be subsequently introduced.

The most difficult cases are those in which severe eclampsia occurs, fit succeeding fit, with perhaps coma intervening, and in which there is no sign of labour, the os remaining more or less closed and the cervix not taken up.

The writer has treated cases of this kind on both the purely expectant plan and on the lines of active interference. While he does not think that there is a great difference in the results, he has formed the opinion that those obtained when early evacuation of

the uterus is aimed at, are somewhat better than those resulting from a policy of non-interference. If interference is undertaken, one of the rapid methods of delivery should be chosen, and the whole proceeding should be carried out under chloroform anæsthesia. In the writer's opinion, bougies, packing of the cervix and vagina, tents and rubber dilating bags, are out of place in the treatment of eclampsia. One simple method of inducing labour which can be carried out without producing any prolonged irritative effects, as the methods just mentioned may do, is *puncture of the membranes*.

For this small operation it is better to administer chloroform. This having been done, a Sims' speculum should be passed and the vagina and cervix should be well cleansed with swabs wrung out of an antiseptic solution; a sound is then passed into the uterus and the membranes ruptured.

The rapid methods of delivery available for the class of case we are now considering are the following: Dilatation by Bossi's dilator; deep incisions of the cervix, including the so-called vaginal Cæsarean section; abdominal Cæsarean section. Opinions differ as to the relative value of these operations and, needless to say, they are all equally condemned by the advocates of non-interference; it will be readily granted even by their advocates that they are difficult to carry out or inadvisable in many cases in private practice.

A brief consideration of each of these methods may now be undertaken.

The Metallic Dilator of Bossi is a powerful instrument, having four expanding blades; when opened to the fullest extent, they give an intervening space with a diameter of 4 inches. Modifications of the instrument are Frommer's dilator having eight blades, and De Seigneux's, which has four blades, as in Bossi's, but set at an angle with the stem and not in a line with it, as in Bossi's instrument. The instrument requires a certain amount of dilatation of the cervix before it can be introduced, but this will generally be found to be present, even though labour has not actually commenced. If the cervix will not admit the instrument, Hegar's dilators should be used to secure the requisite amount of dilatation.

The operation should be performed with the patient in the lithotomy position. The dilator should be introduced and the end of each blade should be passed well beyond the internal os. To do this it will be necessary to pass the handle well back to the perineum. When the blades are in position, the screw which expands the blades should be turned at intervals. This should not be done during a pain, and the handle should not be turned more than a quarter of a circle at once. The cervix should be examined

at intervals by the finger during the process. The dilatation should take from half to three-quarters of an hour, and when completed the child may be extracted by forceps or by podalic version. The great danger of Bossi's dilator is laceration of the cervix and dangerous hæmorrhage. Some authorities will not use it for cases in which the cervical canal is not taken up, such as we are now considering, but would limit its use to the kind of case in which digital dilatation has been advised above.

Incision of the Cervix is an old method of hastening delivery, and when the cervical canal is well taken up and the wall of the cervix thinned, the external os remaining undilated, it is safe and easy to incise the cervix with scissors, two or three incisions being made radiating from the edge of the external os.

Of late years, however, much more extensive incisions have been employed in cases in which the cervical canal is undilated, and the unsuitable name of *vaginal Cesarean section* has been given to one method of carrying out this operation. This may be briefly described :

The patient is placed in the lithotomy position and the vagina well cleansed ; the cervix is then seized with two pairs of volsellum forceps, one on each side of the middle line in front, or a ligature on each side may be passed and used to draw down the cervix ; this takes up less room. A transverse incision is then made across the front of the cervix below the reflection of the bladder, and it is well to make a longitudinal incision on the vagina wall from the middle of this transverse incision so as to get more room ; the bladder is then carefully peeled off the anterior surface of the cervix and pushed up by the fingers, as is done in performing vaginal hysterectomy ; when the cervix is laid bare, it is split up in the middle line with scissors, traction being meanwhile kept up on the volsella or ligatures. When sufficient room has been obtained, the membranes are ruptured, the child seized and delivered, the membranes and placenta are extracted by the hand, and a hot intra-uterine douche given. The uterus is then sutured with catgut, and the vaginal wound closed in the same way.

Some advise a posterior incision as well as the anterior when the operation is performed in the later months of pregnancy. For the posterior incision of the uterine wall, the posterior fornix is incised transversely and the peritoneum of Douglas's pouch is pushed up, until a sufficient area of uterine wall is exposed ; this is divided in the middle line with scissors.

Abdominal Cesarean Section need not be described here in detail, as it will be found elsewhere in this volume. As regards

its place in the treatment of eclampsia, it may be considered to be the most rapid method of emptying the uterus. If rapid emptying is considered to be an essential part of the treatment of eclampsia and the surroundings are favourable for an abdominal section, there is much to be said in favour of this operation, especially in primiparæ, in whom both dilatation by Bossi's dilators and deep incisions of the cervix, as above described, present greater difficulties than in multiparæ.

From the child's point of view Cæsarean section is much more favourable than these other two operations, and when the child is alive and at full term this consideration should have some weight.

In reference to all the methods of dealing with the condition it may be mentioned that a moderate amount of post-partum hæmorrhage is not a disadvantage in these cases.

C. E. PURSLOW.

HÆMORRHOIDS IN PREGNANCY.

HÆMORRHOIDS are apt to become very troublesome during pregnancy for the same reasons that varicose veins elsewhere enlarge during that period. Constipation is a great contributory cause, and consequently always requires treatment, as under other conditions hæmorrhoids during pregnancy are prone to thrombose and to protrude through the anus, after which they may become ulcerated, with consequent exacerbation of pain. Of all the laxative medicines the senna preparations answer best for this troublesome condition, *confectio sennæ* (3j *omni nocte*) being the usual one to order. Cold infusion of senna pods is, however, a very favourite prescription, and has the great advantage that its dose can be easily regulated. It is usual to begin with ten pods, the amount being increased or diminished as may be necessary in any individual. The pods are placed in half a tumbler of cold water at 10 a.m., the liquor is poured off at 10 p.m., the pods being thus soaked for twelve hours. The liquor is to be taken on going to bed at night. There is no objection to this being taken for long periods.

Locally, treatment is often required for the burning, sense of weight and rectal tenesmus. Ointments will often give relief, of these: *Unguentum Hamamelidis* [U.S.P., R. *Fluidextracti Hamamelidis Foliorum*, 1 part; *Adipis Lanæ Hydrosi*, 9 parts], *Unguentum Gallæ c̄ Opio* [U.S.P., R. *Unguenti Gallæ*, 13 parts; *Pulveris Opii*, 1 part], and *Unguentum Calomelanos* (*Calomel*, gr. 30; *Paraffin. Mollis*, ad 3ss) being the more generally useful preparations.

For thrombosed piles nothing gives so much relief as hot fomentations, particularly *Lotio Plumbi c̄ Opio* (*Extracti Opii*, gr. 5; *Liquoris Plumbi Subacetatis Diluti*, *Aquæ aā* 3j).

If pain is very severe, the thrombosed pile should be incised and the clot turned out, this being followed by plain hot boracic fomentations frequently repeated.

Operations for the removal of hæmorrhoids are not recommended during pregnancy for two reasons: firstly, because the piles generally disappear after delivery; secondly, because these operations have been found not to do very well, owing to the great venous congestion, constipation, etc., which have caused the piles to appear.

THOS. G. STEVENS.

HYDRAMNIOS.

THE normal amount of liquor amnii is from 1 to 2 pints. In hydramnios this may be increased to several gallons.

The diagnosis of the condition is as a rule easy, and mistakes ought not to occur if the patient is examined carefully. In the majority of cases, there is a history of pregnancy, and though on examination in severe cases it may be impossible to demonstrate the presence of the fetal parts, the fetal heart may usually be heard or *ballottement* obtained in the knee-elbow position.

The condition has to be distinguished from ascites, an ovarian cyst or a distended bladder. Two types are met with, chronic and acute hydramnios.

In **chronic cases** the distension, although great, rarely gives rise to acute and urgent symptoms; the abdomen accommodates itself to the gradual increase in the size of the uterus.

There is no drug which has any control over the production of liquor amnii; all that can be done is to palliate the distress caused by the pressure of the uterus. All undue exertion must be avoided. Sudden changes of position are specially to be guarded against and the abdomen should be supported by a firm and well-fitting belt.

Constipation is almost invariably present and the daily action of the bowels should be ensured by the use of one or other of the mild laxatives. Albuminuria is frequently present.

In the majority of cases labour comes on prematurely. Owing to distension of the uterus, inertia, prolonged labour and post-partum hæmorrhage are likely to occur. Rupture of the membranes and a sudden and profuse gush of liquor amnii is extremely likely to cause a prolapse of the cord and mal-presentation of the fetus.

The management of labour demands no special treatment, but the action of the uterus should be watched with extreme care, and, if malpresentation occurs, appropriate treatment should be adopted without delay.

There is no doubt that the administration of strychnine, either alone or in combination with quinine, during the last few weeks of pregnancy is beneficial in guarding against the occurrence of uterine inertia and its consequent evils.

Occasionally in cases of chronic hydramnios, the pressure symptoms are so distressing that pregnancy has to be terminated, artificial labour being induced either by the introduction of bougies or by puncture of the membranes.

The rapid enlargement of the uterus in cases of acute hydramnios usually gives rise to urgent pressure symptoms, and immediate evacuation of its contents is almost always indicated. The membranes should be punctured by means of a sound, and the opening should, if possible, be small, so as to allow of the slow discharge of liquor amnii. By this means the shock and collapse which is apt to occur owing to the sudden diminution in size of the uterus, if much liquor is allowed to escape at once, is avoided. Puncture of the membranes is usually not a matter of much difficulty. The patient should be placed in the left lateral position with the buttocks slightly raised. The perineum should be well retracted with a Sims' speculum, when the cervix will usually at once come into view. If necessary, it can be grasped with a volsellum, a sound passed and the membranes ruptured. There will be an immediate flow of liquor amnii and labour generally commences in a few hours. Diminution in the size of the uterus usually leads to an immediate amelioration of the pressure symptoms.

During the escape of the liquor amnii the correct lie of the child should be verified by abdominal palpation. Any abnormal presentation should be rectified.

After the first rush of liquor has escaped an antiseptic pad should be placed over the vulva.

If it has been decided to induce labour without rupture of the membranes, this is best done by passing one or more solid gum-elastic bougies into the uterus (*see* Induction of Labour).

Whatever method is adopted, the most stringent antiseptic precautions should be taken. All instruments should be boiled. The genitals should be thoroughly cleansed with soap and water and afterwards swabbed with a solution of perchloride of mercury (1 in 1,000). The vagina should be douched with a solution of perchloride of mercury (1 in 5,000).

Oligo-hydramnios is a rare condition in which the amount of liquor amnii is deficient. It is frequently associated with deformity of the fœtus or adhesion between the fœtus and the amnion which may give rise to dystocia or hæmorrhage, necessitating appropriate treatment. Even if a diagnosis is made before delivery, no treatment is of any avail.

A. LIONEL SMITH.

INSANITY OF PREGNANCY.

A SLIGHT degree of mental aberration is common in pregnancy, but in only very few cases does this go on to actual insanity. But cases have been noted in which a woman has become insane in several successive pregnancies.

The usual form assumed by insanity at this period is that of mental depression and apathy passing on to melancholia; it is commonest in the latter half of the gestational period, and usually passes away after delivery, but in some cases it goes on into puerperal insanity. There is a marked tendency to suicidal impulses.

As regards causation, heredity, as in all other forms of insanity, is an important factor. The mental agitation caused by an illegitimate pregnancy is also a powerful cause of this form of insanity, something like 25 per cent. of the cases occurring in unmarried women.

Treatment.—If it is at all possible, it will be well to keep the patient at home, particularly for the child's sake. Careful nursing is essential, and when suicidal impulses are present the patient should never be left unguarded. The patient should be kept as much as possible in the open-air. The food should be nourishing and easily digestible, the main reliance being placed on milk and eggs. If there is excitement or insomnia, the safest hypnotic is potassium or sodium bromide in doses of 40 to 60 gr.

The administration of hot milk at bedtime and of a hot bath are useful adjuvants to the bromide.

Another hypnotic which has been highly spoken of is paraldehyde, in doses of 1 to 2 drachms in 1 oz. of water, flavoured with *syrupus aurantii*. Thyroid extract in doses of 5 gr. three times daily has been strongly advocated in melancholic cases.

The question of induction of abortion or premature labour will arise, and on this there is great difference of opinion, both among obstetricians and alienists; on the whole, the writer, though from a limited experience, is inclined to favour the proceeding when the case is getting worse in spite of the treatment outlined above. This operation should never be undertaken without a consultation with another medical man.

A woman who has gone through an attack of puerperal insanity in any of its forms should be advised not to incur the risk of another pregnancy.

C. E. PURSLOW.

MEDICAL DISEASES IN PREGNANT WOMEN.

So material is the change produced in a woman by pregnancy that upon *a priori* grounds one would not have been surprised if pregnant patients developing medical diseases required different treatment to that usually adopted in non-pregnant cases of the same kind. One might have expected either that the pregnancy might need to be terminated artificially or else that the remedies and other therapeutic measures recommended for the disease itself would be different. On the contrary, however, the vast majority of cases of intercurrent illness in association with pregnancy require treatment upon precisely the same lines as if the patient were not pregnant. It is true that the prognosis as regards the infant is often rendered materially worse when the mother falls ill, so that when there are special circumstances in the case which make it desirable to advise for the infant's sake rather than the mother's, it may be that the induction of labour may be advised on that score, if the fœtus is already viable; but from the mother's point of view, only in a few instances, discussed below, is it of any advantage to the treatment that pregnancy should be terminated, so that upon the whole it is exceptional for induction of labour to be recommended. If any material departures are made from the treatment adopted in any other cases, they will chiefly be in two directions: firstly, rest in bed will generally be advocated sooner and persisted with longer in pregnant than in non-pregnant patients; secondly, very potent drugs which might injure the fœtus, hyoscine hydrobromide for instance, would be used with even greater caution than usual.

It is needless to deal with each individual medical illness that may be met with in a pregnant woman. Those in which, though abortion may occur spontaneously, it should not be induced, and in which the ordinary medical treatment should be adopted, may be simply enumerated as follows:

Measles.	Meningitis.
Whooping cough.	Coryza.
Mumps.	Hay fever.
Chicken-pox.	Asthma.
Smallpox.	Laryngitis.
Influenza.	Tonsillitis.
Syphilis.	Stomatitis.
Tetanus.	Bronchitis.

Emphysema.	Cancer, except that of pelvic organs.
Bronchiectasis.	Hepatic abscess.
Gangrene of the lung.	Pancreatic lesions.
Acute rheumatism.	Simple goitre.
Acute endocarditis.	Lymphatic leuchæmia.
Acute pericarditis.	Hodgkin's disease.
Indigestion.	Splenic anæmia.
Gastritis.	Pernicious anæmia.
Gastric ulcer.	Purpura simplex.
Duodenal ulcer.	Purpura hæmorrhagica.
Dilatation of the stomach.	Hæmophilia.
Enteritis.	Perinephric abscess.
Colitis.	Hydronephrosis.
Intestinal colic.	Pyonephrosis.
Biliary colic.	Acromegaly.
Renal colic.	Dysentery.
Intestinal worms.	Actinomycosis.
Cirrhosis of the liver.	Hydatid disease.
Gallstones.	Raynaud's disease.
Diarrhœa.	Erythromelalgia.
Constipation.	Angeo-neurotic œdema.
Epistaxis.	Milroy's hereditary trophœdema.
Hæmatemesis.	Plague.
Hæmoptysis.	Hydrophobia.
General peritonitis.	Glanders.
Intestinal obstruction.	Dengue.
Aneurysm.	Beri-beri.
Thrombosis.	Bilharzia hæmatobia.
Embolism.	Scurvy.
Cerebral hæmorrhage.	Cholera.
Acute poisoning.	Typhus fever.
Chronic poisoning.	Relapsing fever.
Gout.	Yellow fever.
All skin diseases, except herpes gesta-	Mediterranean or Malta fever.
tionis, urticaria, and psoriasis.	

Even in the greater number of maladies not mentioned in the long list above it is generally wisest to treat the patient precisely as though she were not pregnant. A few special remarks are demanded by each of the following :

Typhoid fever.	Appendicitis.
Malaria.	Diabetes mellitus.
Scarlet fever.	Diabetes insipidus.
Diphtheria.	Ascites.
Erysipelas.	Intra-abdominal tumour of great size.
Anthrax.	Spleno-medullary leuchæmia.
Cerebro-spinal meningitis.	Plumbism.
Lobar pneumonia.	Herpes gestationis.
Pulmonary tuberculosis.	Urticaria.
Pneumothorax.	Psoriasis.
Pleurisy with or without effusion.	Rheumatoid arthritis.
Tuberculosis other than pulmonary.	Osteo-arthritis.
Addison's disease.	Filariasis.
Nervous diseases, especially transverse	Exophthalmic goitre.
myelitis and epilepsy.	Myxœdema.
Tetany.	Mollities ossium.
Chorea.	Anæsthetics and operations.
Heart disease.	Hyperemesis gravidarum.
Jaundice.	Renal conditions.

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Typhoid Fever, so far as the mother is concerned, needs no different treatment to that employed in other cases ; nor is the patient's prognosis rendered materially worse by her being pregnant. Not so as regards the child, however ; there is evidence to show that before the end of the third week of the mother's illness the foetus is much less likely to have become infected across the placenta than it is in the fourth or a later week. It does not follow that if the pregnancy is allowed to continue the foetus is bound to die, for many have been born alive and have survived ; but the chances of abortion or stillbirth are considerable. Induction of labour does not seem to make the prognosis as regards the mother worse, so that if the pregnancy has reached the time when the child is viable and if for any reason it is much desired that a living child should be born, it would seem that the best advice for the physician to give would be that of delivering before the mother's illness has reached the end of the third week.

Malaria is itself so variable in degree that it is not easy to gauge the effect of pregnancy upon it. Upon the whole, the evidence goes to show that the effects upon the mother are no different to what they are upon non-pregnant women, but when the febrile paroxysms are severe there is great liability to spontaneous abortion. If the pregnancy will continue, however, it should be allowed to do so. The foetal movements and the uterine contractions tend to become excessive during the acute malarial attack, and some authors have stated a belief that this tendency is aggravated by the giving of quinine. It has even been urged that quinine should not be given in such large doses, or even at all, to a pregnant woman with malaria, on the theoretical ground that this drug itself increases uterine contractions and predisposes to abortion ; but in practice it is found that the greatest tendency to premature delivery occurs in cases in which no quinine is given, and it is emphatically urged by those who have had experience that quinine should be given all the more on account of the conjunction of pregnancy with malaria. It actually makes the uterine contractions less than they are in cases in which no quinine is given, and, by diminishing the pyrexia and lessening the frequency of the attacks, not only is the prognosis as regards the mother's life greatly improved, but also the chances that the child will be stillborn are very considerably diminished.

Scarlet Fever in a pregnant woman has generally been regarded as a very grave affection ; the new treatment for scarlatina without isolation, painting the tonsils with carbolic oil and smearing the skin all over twice daily with eucalyptus oil, seems to have so

minimised the dangers of the disease, however, that it should certainly be adopted when scarlet fever arises in a pregnant woman. The avoidance of any need to transfer the patient to a ward full of other scarlet fever cases must very greatly minimise the risk of streptococcus infections (*see* Scarlet Fever, Vol. I.).

Diphtheria, Erysipelas, Anthrax, and Cerebro-spinal Meningitis may be considered together, because they are all diseases that are treated by means of serum, anti-diphtheritic, anti-streptococcus, Sclavo's, and anti-meningococcus respectively. The question might arise as to whether the serum should be employed in the same doses in pregnant as in non-pregnant cases. There is a decidedly greater tendency for pregnant or puerperal women to develop urticaria and other serum phenomena about ten days after the injections, but notwithstanding this, the serum treatment should be employed and the doses should be at least not less than those used in other cases.

Lobar Pneumonia is a malady in which the prognosis is rendered very materially worse if the patient is at the same time pregnant, unless the pregnancy has not yet passed the earliest months. With each succeeding month the prognosis as regards both the mother and the fœtus becomes steadily worse and worse. When the pneumonia sets in after the sixth month, two-thirds of the pregnancies end spontaneously and half the mothers die. More than one series of cases has been treated by inducing abortion or delivery as early as possible, but the prognosis is made even worse thereby, so that the best treatment is to attend to the pneumonia itself just as one would in any other severe case and to leave the pregnancy alone unless and until it comes to an end spontaneously.

Pulmonary Tuberculosis is itself so very variable in its course that one might have thought it would be difficult to detect any influence of pregnancy upon it. The reverse is the case, however; it is clearly established that the progress of pulmonary tuberculosis tends to remain stationary or even to retrogress during the period of carrying, whilst immediately after labour the disease advances with immense strides and in many cases causes death within a month of delivery. It is highly dangerous, therefore, for a patient suffering from active tuberculosis to fall pregnant; should she do so, it may be thought advisable to empty the uterus in the second or third month, when the disturbance of the patient's general system is relatively slight; but if these early months have passed, it is better to leave the pregnancy alone and to adopt every reasonable hygienic and therapeutic measure, which can assist the patient to heal her lung lesions before the time of natural delivery arrives.

Pneumothorax and Pleurisy, in pregnant women are nearly always the effects of tuberculosis of the lungs, so that the remarks contained in the preceding paragraph apply to these conditions also, with the addition that the special treatment for the complication, including paracentesis if need be, will be resorted to.

Tuberculosis other than pulmonary is not influenced so easily by the puerperium; nevertheless every possible step should be taken to improve the patient's general strength whilst she is carrying, in case the tuberculous lesions should be lit up as the result of diminished resistance after labour. Lupus, tuberculous glands, arthritis, spinal caries, tuberculous peritonitis, iritis, all these forms of tuberculosis can be traced in a large percentage of cases to bovine tubercle bacilli derived from milk; a pregnant woman is often encouraged to drink extra milk each day, and this is a source of danger; if she already has a peripheral tuberculous affection, she should either stop taking milk altogether, or sterilise it by long boiling, or make sure that she gets her supply from a known cow that has been tuberculin-tested recently. Even in country places where patients get milk from their own cows, it is astonishing how often a supply hitherto regarded as unexceptionable is found to be tuberculous on careful investigation. The patient will receive tuberculin, surgical and other treatment on precisely the same lines as if she were not pregnant.

Addison's Disease is really a variety of tuberculosis, but the symptoms are so special that the disease merits separate mention. If the patient already has the symptoms early in the pregnancy, it is exceedingly unlikely that she will survive till term. The prognosis depends less upon the presence of tubercle bacilli than upon the absence of suprarenal tissue and secretion, so that the general rule that the effects of tuberculous lesions are not made worse during pregnancy does not apply here. Asthenia, syncopal attacks, vomiting and pigmentation all increase rapidly. The patient becomes so ill that the medical attendant will nearly always feel impelled to induce abortion or labour, and yet the patient's life is seldom if ever prolonged thereby. Pregnancy is a very bad thing for a patient who has Addison's disease.

Nervous Diseases may already exist before the patient becomes pregnant; disseminated sclerosis, for instance, or progressive muscular atrophy, and so on; in addition to this, pregnancy seems actually to predispose to, or even to cause, certain less definite nervous lesions of the nature more particularly of anterior polio-myelitis or peripheral neuritis. There is no need to terminate the pregnancy unless, perhaps, in very exceptional instances; even when the patient

is entirely paraplegic and anæsthetic from the umbilicus downward, as the result of compression or transverse softening of the cord, pregnancy tends to terminate in natural labour, the infant being healthy and the mother's breasts secreting milk just as if there were no lack of continuity in the spinal cord. Epilepsy is a very sad malady to be associated with pregnancy on account of the neuropathy of the offspring, but so far as the treatment of the mother is concerned the same remedies should be employed as in other cases. Bromides are transmitted across the placenta, and therefore they should not be given in larger doses than will just suffice to keep the mother from having convulsions.

Tetany is in any case a rare malady in adults, and although pregnancy is said to be one of its causes the association of pregnancy with it is very rarely seen. The symptoms in those very rare cases in which the two happen to coincide may be very alarming, but there is little real need for anxiety; the patient recovers under simple treatment in bed with or without medicines and the pregnancy goes to natural term.

Chorea Gravidarum was formerly given an exaggerated importance owing to the fact that an erroneous method of collecting cases from the literature led to wrong conclusions as to the prognosis. It is true that chorea in pregnant women is less free from danger than is St. Vitus' dance in children, but about 95 per cent. of the mothers get well and the pregnancy does not tend to terminate abnormally. At one time it was thought that the malady was intrinsically distinct from chorea of children and not rheumatic like the latter; all the recent evidence, however, goes to show that there is no such distinction in kind, and certainly the best treatment to adopt for chorea gravidarum is rest in bed and aspirin, as described for ordinary chorea. The movements are sometimes very violent indeed (chorea insaniens) so that chloroform inhalations may be required for a time, or hyoscine hydrobromide may be given hypodermically in doses of from $\frac{1}{200}$ to $\frac{1}{100}$ gr. The prognosis is by no means measured by the severity of the movements; the best guide is the temperature chart. So long as there is no pyrexia there is no need to be anxious; the presence of pyrexia is an evil sign. It is not the chorea that kills, but the rheumatic microbial toxæmia that may be associated with it; ordinary chorea gravidarum is to fatal chorea gravidarum, as ordinary endocarditis is to malignant endocarditis. The importance of this in relation to the question of treatment by evacuating the uterus is great; so long as there is no pyrexia the patient is in no danger and the pregnancy

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should continue naturally; as soon as there is pyrexia which cannot be explained by obvious tonsillitis or other similar cause, the patient is in a septicæmic state and emptying the uterus will not save her. The best rule to follow is to treat the chorea with the greatest care from the beginning like an ordinary case of chorea (*q.v.*); to allay any mental excitement whenever possible—illicit pregnancy kept secret is an exciting mental factor in not a few of these cases; to give large doses of aspirin; to nurse well; to pad the bed; to induce sleep; to give simple but abundant food; and to remove the patient from any neighbourhood such as London in which acute rheumatism abounds.

Heart Disease is by no means incompatible with perfectly normal pregnancies; the mere fact of there being a heart lesion does not at once imply that treatment is required. When there is good compensation, this should be kept up by ordinary daily exercise, so that there may be a definite reserve of cardiac muscular strength. When symptoms of heart failure set in during pregnancy, however, or still worse if pregnancy occurs, as it never ought to, in a patient whose heart is already uncompensated, the consequences are apt to be dire and the case full of anxiety. The chief point to decide will be whether the pregnancy should be terminated or not.

There is no doubt that artificial evacuation of the uterus is accompanied by additional strain upon the heart, and that the immediate effect is to make the heart symptoms worse instead of better; on the other hand, continuance of the pregnancy is also apt to cause increasing cardiac failure from interference with the respiratory blood pump and in other ways; hence, it is impossible to lay down any absolute rules, and each case needs to be treated on its own merits. Broadly speaking, one would say that the best plan is to adopt strict measures for restoring compensation, especially by rest in bed and the use of digitalis in full doses, as in other cases of mechanical heart failure; to continue with these measures as long as the general condition of the patient and her heart exhibit signs of improvement; to await natural delivery if the patient's heart has responded to rest and digitalis treatment; but to induce labour if the cardiac symptoms persist without abatement, or still more so if they increase. If there has already been failure of compensation before the patient falls pregnant, the probability is that ordinary treatment for the heart has been adopted already without success; in this case the continuance of the pregnancy is a daily increasing source of danger to the patient, and it will generally be wise to take steps to terminate it as soon as

possible. The nearer the fœtus is to being viable the greater the efforts that should be made to treat and relieve the mother's cardiac condition as though she were not pregnant, leaving the pregnancy to continue if it will.

The commonest heart lesion to come under observation in this respect is mitral stenosis, but the principles laid down above apply also to other lesions, such as aortic disease, angina pectoris, mitral regurgitation, tricuspid stenosis or regurgitation, adherent pericardium, fibroid heart. Cases of fatty heart may require rather more exercise of a strictly measured kind. The only variety of congenital heart disease that is at all likely to be met with in a pregnant woman is patent ductus arteriosus, and if the patient has survived to adult life the compensation is generally so good that no treatment for it is required.

Jaundice in association with pregnancy always needs treating with respect, because of the possibility of its being the beginning of acute yellow atrophy of the liver. There is no reason why a pregnant person should not develop any of the ordinary kinds of jaundice, simple catarrhal, pancreatic, malignant, or due to gall-stones or cirrhosis of the liver and so on, and if one can be certain of the diagnosis in the individual case the treatment should be precisely the same as if the patient were not pregnant. If, however, the nature of the jaundice is obscure, it is most important to keep the patient strictly in bed upon a fluid or fluid and farinaceous diet for the time being, and to watch for the least indication of the onset of acute yellow atrophy. If the liver dulness diminishes, if the patient exhibits cerebral symptoms, or if there are obvious leucin and tyrosin crystals in the urine, the only possible chance of saving the patient would seem to be prompt evacuation of the uterus. If only one knew more of the pathology of the disease, one might be in a better position to anticipate it or even to cure it. Urotropine or helmitol (in 10-gr. doses) three or four times a day is often efficacious in relieving jaundice due to microbic infection of the bile passages.

Ante-partum uterine sepsis has sometimes led to spontaneous abortion and to rapidly deepening jaundice with pyrexia at the same time; these cases prove rapidly fatal as a rule, but if treatment were ever to be successful it would be similar to that adopted in other septicæmic cases; cultures from the patient's blood should be obtained, and serum or vaccine treatment adopted according to the variety of micro-organism found; seeing that streptococci are the commonest type in these cases, it would be wise to give the patient 10 cubic centimetres of polyvalent anti-streptococcus serum

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subcutaneously whilst waiting for the laboratory report upon the blood cultures.

Appendicitis is of much interest in relation to pregnancy; the latter does not seem to predispose to an attack, but if a patient has suffered previously from appendicitis and afterwards becomes pregnant, the pregnancy may light up another attack. This forms an additional argument in favour of removing the vermiform appendix after one attack in a woman who may presently become pregnant. The point which is most pertinent to the present discussion, however, is whether a woman who, being pregnant, develops appendicitis, should be treated in any respect differently to a non-pregnant woman with appendicitis. Should operation be postponed whenever possible? or should operation be urged the sooner because of the pregnancy? Should the pregnancy itself be terminated artificially or not? The answers are as follows: Upon the whole, operative measures for the appendicitis should be accelerated rather than postponed in these pregnancy cases. There are, of course, quite mild attacks in which it is better to take no active steps; but in cases of the next degree of severity where, if the patient were not pregnant it might be thought best to wait, the general consensus of opinion is that operation should be advised on the very grounds that the patient is pregnant, particularly in the later months of pregnancy. Doubtless this will not be the opinion of all, but the reasons given for it seem sound; in the first place, owing to the vascularity of the parts, pus is even more likely to develop in these cases than it is in others; in the second place, the prospect as regards the child is not so good, but the course followed should be almost exclusively that which is in the best interests of the mother; and, in the third place, the emptying of the uterus by spontaneous miscarriage or premature labour is so likely to occur, and with it a rending open of a previously localised inflammation with consequent spread to the general peritoneal cavity, that it is very dangerous to wait. It is in the last degree undesirable that measures for terminating the pregnancy should be resorted to, for fear of breaking down adhesions that are helping to localise the inflammation.

If a pregnant woman develops an attack of appendicitis that is in any degree severe, the available statistics all indicate that the best chance of saving both the mother and the child is by early operation.

Diabetes Mellitus in association with pregnancy is not so common as some authors have supposed. Lactosuria is relatively common, but true glycosuria is comparatively rare, and for fully

developed diabetes mellitus to coincide with pregnancy is rarer still. Opinions differ very materially as to how diabetes mellitus should be treated, but two things are becoming increasingly clear: First, that it is important not to keep diabetic patients in bed; and secondly, that it is a great mistake to be too strict with the dietary. The question whether the pregnancy should be terminated or not in these cases is important. The general conclusions one comes to are that diabetes mellitus is by no means incompatible with pregnancy; that cases of moderate severity are not made materially worse by gestation; and that there seldom seems to be any reason for interfering with the pregnancy. Some observers have even stated their opinion that pregnancy instead of making the diabetes worse actually ameliorates it for the time being, a point of great interest when one recalls the effects of typhoid fever, for example, in similar cases.

Hydramnios is very liable to develop in diabetic pregnancies, and this may need special obstetric attention.

Diabetes Insipidus is itself rare, and it is still rarer for it to accompany pregnancy. The chief points to note about it are that the pregnancy itself runs no abnormal course, that the children may be perfectly healthy, and that there is no marked tendency to hydramnios with its inordinate abdominal distension such as occurs in diabetes mellitus. The mother, however, should be treated with particular care after the confinement, for she seems to be more prone than other patients to develop lung complications, especially tuberculosis.

Ascites in connection with pregnancy needs treatment upon the same lines as in non-pregnant cases, but with two differences: First, if it is decided that paracentesis abdominis is required, the needle cannot be inserted in the usual places, the linea alba or one or other linea semilunaris, on account of the pregnant uterus; it may, however, be possible to puncture the flank instead: secondly, if the ascites recurs rapidly and the patient is physically distressed by the combined causes of abdominal distension, it may be necessary to terminate the pregnancy by artificial means.

Intra-abdominal Tumours of great size may render it physically impossible for both the tumour and the pregnancy to continue together. It becomes necessary either to remove the abnormal mass or else to terminate the pregnancy. One of the very largest tumours to be met with in such cases is the spleen in a patient suffering from Spleno-medullary Leuchæmia. It is impossible to remove the viscus in this disease, but the daily application of the X-rays over it may reduce its size sufficiently to obviate the

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necessity for inducing labour prematurely. Whether the foetus runs any serious risk of damage from the X-rays applied to the upper part of the mother's abdomen in this way has not yet been determined.

Plumbism is a potent cause for abortion; a pregnant patient suffering from any of the symptoms of lead poisoning therefore should be treated for her plumbism with even greater attention to detail than an ordinary case; and it may be necessary to keep her resting in bed as much as possible to minimise the liability to abortion.

Herpes Gestationis may be described as being dermatitis herpetiformis directly due to pregnancy. The great majority of cases resist treatment so long as pregnancy continues, but recover completely soon after delivery; it is exceptional for the skin eruption to continue far into the puerperium. There is no indication for terminating the pregnancy by artificial means however, for the malady is not dangerous to the life of either the mother or the foetus. Treatment should be on precisely the same lines as that of dermatitis herpetiformis (*q.v.*). The best internal remedy is arsenic in increasing doses, together with small doses of belladonna. The sleeplessness produced by the irritation generally necessitates the use of opiates.

Urticaria and Pruritus are common in pregnant women, arising without any dietetic or other definite cause. It is probable that between pruritus at one end of a chain and the bullous eruption, herpes gestationis, at the other there are all degrees of itchy and irritative affections directly attributable to pregnancy in certain women. When the pregnancy ends, the skin irritation ceases, but there is no need to terminate the gestation artificially, and the ordinary lines of treatment for the skin affections will be followed. Both pruritus and urticaria are relieved better by arsenic and belladonna in these cases, however, than they are by laxatives or intestinal antiseptics: *R. Liqueur Arsenicalis*, $\text{m}5$; *Tincturæ Belladonnæ*, $\text{m}5$; *Aquam Chloroformi*, $\text{ad } 3\text{ss}$ [*U.S.P. R. Liqueur Potassii Arsenitis*, $\text{m}5$; *Tincturæ Belladonnæ*, $\text{m}6$; *Aquæ Chloroformi*, 3ij .; *Aquam*, $\text{ad } 3\text{ss}$]. Dose: One tablespoonful diluted with half a tumbler of plain water thrice daily after food.

One minim of liquor arsenicalis [*U.S.P.*, liquor potassii arsenitis] or 1 min. tincture of belladonna, or 1 min. of each, according to circumstances, may be added to each dose at intervals of a few days, though it would be unwise to exceed 10-min. doses of either.

Psoriasis exhibits a variable behaviour in relation to pregnancy;

before the birth of the child the mother, if she is already subject to psoriasis, will either be very much less troubled with it than before or else will develop a severe exacerbation. It is not possible to give any certain prognosis as to which of these two things will occur, but patients have their skin disease more often mitigated than increased whilst they are actually pregnant. On the other hand, the effect of lactation upon psoriasis is almost invariably bad. This tendency may be minimised by beginning a course of arsenic shortly before labour. The eruption is liable to increase during the puerperium in any case, but if the mother suckles her child she is almost certain to develop a very severe attack of psoriasis. This, therefore, is one of the conditions under which the mother ought not to suckle her infant. A wet nurse or artificial feeding should be adopted from the beginning, and immediate steps taken to dry the mother's breasts.

Rheumatoid Arthritis and Osteo-arthritis require special mention in connection with pregnancy only in regard to the mechanical difficulties which may occur in the matter of delivery owing to extremes of deformity, especially at the hip-joints. The significance of these in any given case will be obvious; for the rest the treatment should be the same as in non-pregnant cases.

Filariasis, rare in this country but not uncommon in certain parts of the tropics, requires mention only on account of the possible difficulties in delivery to which it may give rise, when it takes the form of elephantiasis involving the genital organs. Such cases may require either surgical removal of the surplus tissues, or artificial termination of the pregnancy before term.

Exophthalmic Goitre is by no means incompatible with normal pregnancy going to full term; it depends entirely upon the mental attitude of the patient towards the fact of her being pregnant whether it will do her good or harm. If she is glad that she is pregnant and can be assured that it is perfectly safe for her to be so, her general symptoms will be ameliorated rather than increased; if, on the other hand, the thought of her being pregnant excites her, it may do her harm or even send her into fatal coma. A few cases may become so excited and ill that the best course to follow may be to terminate the pregnancy; far oftener, however, the treatment should be that of as little interference as possible, avoidance of excitement and of too much physical fatigue, the patient's life being made as placid as possible, and no particular remedies being used unless the symptoms are serious enough to entail continued rest in bed. If it is decided that the pregnancy may be allowed to continue, the treatment of the exophthalmic goitre may

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be precisely the same as that adopted in other cases, except that those who generally recommend operative measures for it would probably do so with even greater caution when the patient was pregnant.

Myxœdema is not incompatible with normal pregnancy and labour. The chief danger is that the infant may be a cretin, so that careful watch should be kept over it after birth, and, if need be, thyroid treatment adopted without undue delay. The mother should be given precisely the same doses of thyroid extract for her myxœdema, as she would have been given were she not pregnant.

Mollities Ossium or **Osteo-malacia** seldom, if ever, occurs in this country, though it is said to be endemic in certain parts of the Continent. It seems to be directly due to some affection of the ovaries, and it is aggravated by pregnancy. It is chiefly of importance on account of the interference with delivery that the crumpled rostrate pelvis gives rise to, and premature delivery or other operative measures may be called for. It is an incurable disease in so far that deformities due to it remain; but further progress of the malady can be checked by removal of the ovaries.

The Giving of Anæsthetics and the Performance of Operations upon pregnant women will not be undertaken lightly or upon any grounds that have not been fully considered. Any operation that can be postponed safely till after delivery should be put off; but there are many circumstances under which an operation has to be performed, notwithstanding the existence of pregnancy. Acute abdominal conditions, such as general peritonitis from perforated gastric ulcer, or intestinal obstruction by a band, may need laparotomy at the earliest possible moment; appendicitis has been discussed above; an early cancer of the breast should be removed without delay; and so on. It is remarkable how well most pregnant women bear anæsthetics and operations and how the pregnancy continues, even when the parts dealt with have been pelvic, or even actually attached to the uterus. If the anæsthetic and the operation tend to cause premature delivery at all, it is in the later months of pregnancy; in the earlier months necessary operations may be undertaken with confidence.

The treatment of **Hyperemesis Gravidarum** and of **Renal Conditions** occurring during Pregnancy is described elsewhere.

HERBERT FRENCH.

MOLE, BLOOD OR CARNEOUS.

THE blood mole is formed by repeated hæmorrhage into the substance of the ovum during the early weeks of pregnancy, usually before the formation of the placenta. The symptoms are those of abortion and the treatment is discussed under that heading.

A. LIONEL SMITH.

MOLE, HYDATIDIFORM OR VESICULAR.

VESICULAR DEGENERATION should be suspected if the size of the uterus is considerably greater than the period of pregnancy would account for, especially if the excessive enlargement is accompanied by hæmorrhage and discharge. The diagnosis is certain, if vesicles can be demonstrated in the discharge.

The disease always gives rise to abortion, but the process is usually incomplete.

As soon as a certain diagnosis has been made, the cervix should be dilated and the uterus emptied as has been described under the heading of Abortion, great care being taken to separate the vesicles from the uterine wall.

The operation should be carried out with the fingers, as the curette, if used, is extremely likely to perforate the uterus, which is always markedly softened.

Owing to hæmorrhage and discharge, there is an increased liability of septic infection and stringent antiseptic precautions should always be taken.

A certain proportion of cases of hydatidiform mole develop chorion-epithelioma later. For this reason a periodical examination of the uterus should be made for some months after the abortion has occurred. By this means an early diagnosis can be made and operative measures can be adopted before the disease has become generalised.

A. LIONEL SMITH.

PARALYSES OF PREGNANCY.

VARIOUS forms of paralysis have been attributed to the toxæmia of pregnancy, among which we may mention : Complete amaurosis without ophthalmoscopic changes ; multiple peripheral neuritis ; localised peripheral neuritis ; myelitis with complete paraplegia.

In these cases there will usually be present albuminuria and frequently some of the symptoms which have been described under Albuminuria and Eclampsia. The treatment of these will follow mainly on the lines laid down for the treatment of albuminuria, especial importance attaching to purgation and dieting.

Similarly the question of induction of abortion or premature labour will arise, and if the paralysis is not improved by the eliminative treatment adopted, obstetrical interference may be indicated.

C. E. PURSLOW.

PENDULOUS BELLY.

THIS condition, the result of stretching of the abdominal muscles in previous labours, requires treatment by an abdominal belt or binder during pregnancy. The belt should not reach higher than the navel, in order that it may exert an upward and backward pressure on the abdominal contents. It is required not only to keep the uterus in place, but also to relieve the constant dragging pain which this condition gives rise to in the upright position.

During labour a tight binder should also be worn in order to make the axis of the uterus correspond with the axis of the upper part of the pelvic cavity, and so allow the presenting part to sink into the pelvis. A pad may be placed on each side of the uterus under the binder, in order to keep the uterus quite symmetrically in the abdomen.

Frequency of micturition, or even incontinence, may occur with pendulous belly from pressure on the bladder. This symptom will be relieved by keeping the uterus in position with the binder. It must not be forgotten that pendulous belly is sometimes the result of contraction of the pelvis because the presenting part cannot sink, in which case careful diagnosis of the variety and extent of the contraction must be made and the appropriate treatment adopted (*see Contracted Pelvis*).

In some cases, in spite of the binder, the presenting part will not enter the pelvic brim even when no obstruction to delivery exists. In such cases, with a vertex presentation, the forceps should be used to pull the head into the brim when the cervix is fully dilated. In all cases of labour in this condition the dorsal position will assist the entrance of the presenting part into the brim and the delivery of the child.

THOS. G. STEVENS.

PERNICIOUS VOMITING OF PREGNANCY.

In considering the treatment of this condition it must not be overlooked that all cases of *severe* vomiting in pregnancy are not truly pernicious. This term must be reserved for those cases in which the urine contains albumen, blood and casts, shows a diminution of the urea output and an increase in the ammonia co-efficient of the total nitrogen. Further, these cases usually have a febrile stage, after which coma may develop, leading to a fatal termination. On the other hand, in the severe cases of hysterical origin the urine is normal and there is no fever; but at the same time emaciation may occur, and death from starvation result. Restricting the term "pernicious" to the first variety, it is clearly seen that we have to treat a condition of toxæmic manifestations which are closely allied to those of albuminuria of pregnancy and eclampsia. We must, therefore, direct our attention towards the elimination of toxic substances, the lessening of their production and the prevention of starvation.

Considering Starvation first, it is clear that in any case of severe vomiting of pregnancy all feeding by the mouth is useless; indeed, these patients continue to vomit even when nothing is taken by the mouth. Rectal feeding, therefore, is indicated at once, and in ordering nutrient enemata it may be remembered that 6, 8 or 10-oz. enemata are usually tolerated, retained and absorbed. They should be usually of peptonised milk, with 5 per cent. of dextrose, 5 minims of laudanum [U.S.P. 3 minims] being added if there is any difficulty in the retention of the enema. Whenever nutrient enemata are being given, it is necessary to procure a daily action of the bowels to prevent decomposition of food materials and irritation of the rectal mucous membrane. This is best brought about by high enemata of soap and water, given slowly with the hips elevated, so as to wash out as much of the pelvic colon as possible. As it is also necessary to give saline infusions *per rectum* in these cases for the purpose of diluting toxic substances and promoting diuresis, these may be alternated with the nutrient enemata. The necessity for so much rectal alimentation and infusion is a distinct difficulty, and cannot usually be continued for many days before some irritability commences. Great care is therefore necessary in the giving of these enemata and in the thorough daily clearance of all *débris*.

The Lessening of the Production of Toxic Substance is to

be secured by absolute rest in bed, as no doubt general metabolism plays a great part in the formation of nitrogenous waste substances. Purgation is important, but in a really bad case it is almost impossible to give purgatives by the mouth, because all medicines are vomited as well as food-stuffs. Epsom salts, however, may be given *per rectum* with some chance of a purgative effect being produced. A trial of thyroid extract *per rectum* should be made; seeing that it has an important effect in pre-eclamptic conditions, we may expect that some beneficial effect may result in pernicious vomiting. Five grains at a time may be given, and the dose increased if no evil effects are noted.

The Elimination of Toxic Substances is to be brought about chiefly by saline infusion, which dilutes them temporarily in the blood and promotes diuresis. Inasmuch as there is always some acid intoxication in these cases, it has been suggested that a saline solution, containing carbonate as well as chloride, should be used. It is usual to make use of a 2 per cent. solution of bicarbonate of soda in normal salt solution. Very few patients can retain more than a pint at a time, and often less. Considerable doubt has recently been thrown on the value of nutrient enemata, and it has been suggested that the results are just as good when saline solution alone is used. If this proves to be true, there is no reason why the saline solution should not be given continuously by the drop method, a larger quantity being absorbed in this manner with less disturbance of the patient. The stomach should be washed out occasionally, especially if nutrient enemata are being used, this procedure sometimes having a beneficial effect on the vomiting. If the skin is very dry, sweating should be induced by the use of the hot wet-pack or vapour bath. The probability is that true pernicious vomiting of toxæmic origin will not be relieved even by the above course of treatment, whilst severe vomiting, not of toxæmic origin, will almost equally certainly be relieved permanently. It therefore follows that in a truly toxæmic case the uterus will have to be emptied to cure the patient. The difficulty is to know when to do this, so that the patient is not already in so dangerous a condition as to lead to a fatal result. Statistics of the induction of abortion for toxæmic vomiting are very bad, but it must not be forgotten that the operation has often been delayed so long that the patient is already almost moribund; on the other hand, when performed at the proper time, induction of abortion is a cure for the condition. Until recently, the ammonia co-efficient of the nitrogen output was looked upon as a guide, but some doubt has been thrown upon this by recent writers. It was

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found that the amount of nitrogen, excreted as ammonia instead of urea, might rise as high as 46 per cent. in toxæmic vomiting. It has, however, been shown that this rise of the ammonia co-efficient is the result of starvation alone, and consequently is not a real guide to the metabolic processes going on in the individual. Nevertheless, it can still be looked upon as an index of the dangerous condition of the patient, whether its interpretation is a high degree of toxæmia or simply starvation. Consequently we may use the ammonia co-efficient as a clinical index, and if it rises to 10 or 15 per cent., the advisability of emptying the uterus will have to be seriously considered. Above all, the operation should be done whilst the patient is in a fairly good condition, or it may prove the last straw. Naturally, the method of emptying the uterus will depend to some extent on the period to which pregnancy has advanced. The best method applicable to the third month and onwards is the introduction of the small rubber bag, suggested by Horrocks, carried into the uterus on a catheter, and inflated with an antiseptic solution. Before the third month all that is necessary is to pass a sound into the uterus to rupture the amniotic sac, and then plug the vagina tightly with gauze. Needless to say, these operations must be carried out with the strictest asepsis.

Cases of severe vomiting of pregnancy, not of the toxæmic type, are much more readily cured by a course of treatment very much the same as the above. The improvement begins almost at once, on stopping all food by the mouth for a few days, combined with thorough clearing of the bowels. Mouth feeding can be quickly resumed, and must consist of small quantities of milk and barley-water at first, gradually increased as the tolerance of food is established. In cases definitely showing hysterical stigmata, isolation of the patient from friends is an essential part of the treatment, combined with rectal salines and washing out of the bowel. "Suggestion," no doubt, plays a part in the cure of such cases.

It was long held that uterine displacements and other lesions were a cause of excessive vomiting, and, although this is now discredited, it is well to make a careful examination, and if any definite lesion like a retroversion of the gravid uterus is found, to treat it.

Finally, careful examination of all cases is necessary, to make quite sure that there is no lesion of the stomach itself, such as an ulcer or a new growth, whilst cerebral and other lesions, such as would cause vomiting, must not be overlooked.

THOS. G. STEVENS.

PLACENTA PRÆVIA.

WHEN a diagnosis of placenta prævia is made no time should elapse before emptying the uterus, for the woman may be in imminent danger. The presenting placenta can usually be felt lying over or near the internal os, since the cervix is nearly always dilatable by the finger in such cases, at all events when they occur towards the end of pregnancy.

If the diagnosis of accidental hæmorrhage cannot at the time be excluded, however, it will be the best plan to treat the case as has been recommended for this condition, a very careful watch being kept over the patient, so that in case of a profuse bleeding no time shall be lost. It may be said generally that the probabilities of the case being placenta prævia are in direct proportion to the amount of bleeding.

In the event of placenta prævia causing its characteristic symptoms in the earlier months, roughly before the seventh, the bleeding not infrequently appears before the uterus has shown any sign of activity; and this may happen also, but much more rarely, at or about term.

The cases may be classified into: (1) *those in which bleeding occurs before labour has begun*: (a) Lateral or marginal; (b) central; (2) *those in which bleeding begins with labour*: (a) Lateral or marginal; (b) central.

The methods of treatment in use are as follows: (1) Plugging the vagina; (2) dilatation of the cervix with tents or Hegar's dilators and de Ribes' bag; (3) perforation of the membranes; (4) bipolar version, using the half-breech as a dilator; (5) Cæsarean section.

CASES OCCURRING BEFORE LABOUR HAS BEGUN.

If the cervix will not admit the finger, it must be dilated with Hegar's dilators till it is wide enough to do so, and a diagnosis can then be made of the exact relation of the placenta to the internal os and the lower uterine segment. It is well to carry on this dilatation at once to a size (26 or more in Hegar's scale) large enough to allow of the insertion of a de Ribes' bag or of two fingers.

If the dilators are not available, sterilised laminaria tents may be used, as many as possible being introduced side by side. The

vagina is then to be plugged; or if tents cannot be obtained, plugging alone must be had recourse to. Plugging is by some authorities the operation chosen in any case of this class.

Lateral or Marginal Insertion.—The first step is to introduce a de Ribes' bag. In doing this it must be decided whether the bag should be placed below, that is, outside the membranes and placenta, or should be passed through a hole in the membranes into the amniotic cavity. It is, on the whole, better to keep it outside, for if it is passed into the amniotic cavity it will compress all the structures within a radius of 2 or 3 inches of the internal os. Such pressure may include the insertion of the cord or a loop of it, and so arrest the child's blood supply. If the bag is kept outside the membranes, on the other hand, although it will no doubt during its expansion strip off a little more placenta (the amount stripped off depending on the site of the placenta), the stripping will not take place in any degree dangerous to the child, for the chorion in the case of any but a central insertion will separate more readily on the side opposite to the placental attachment, and will make room for the bulk of the bag on that side. The cord in this case cannot be compressed.

Pains usually begin soon unless the woman is already collapsed from blood loss.

The bag acts in two ways: (1) as a compressor of the bleeding vessels in the uterine wall, and (2) as a dilator and uterine stimulant. Traction may be applied as already described; but this must be very gentle, since the cervix of placenta prævia, owing to its vascular sponginess, is readily torn, and bleeds freely on tearing.

When the bag has been expelled into the vagina, the head descends into the cervix and completes its dilatation, supposing the bag has not displaced the child. It is advisable after the expulsion of the bag to make sure that the vertex is presenting, and has not been replaced by a shoulder. If this has happened, the head can easily be brought into the cervix again by bimanual manipulation.

If now the head does not descend well, it should be brought as far down as the perineum by the forceps.

When the child is in a podalic lie, the breech will act in the same way as the head, and there is no need for interference unless the bleeding persists or the breech is impacted. In either of these events, or in the case of a transverse lie, Braxton Hicks' method of bringing down one leg is the best treatment. Two fingers are to be passed up by the side of the placenta and through the membranes, a foot seized, and the leg brought so far down into the

vagina that the cervix is plugged by the half-breech. Gentle traction can be made on the leg if necessary.

This mode of treatment may be used in a vertex case, if de Ribes' bag is not at hand.

By the use of the bag in cases of cephalic lie twice as many children's lives are saved as by version. The foetal mortality with the bag, taking all cases of placenta prævia, is from 30 to 40 per cent.; while, when bipolar version is used, it is from 70 to 80 per cent. It is of vital importance to remember that the mother's life must not be endangered for the sake of saving that of the child. If, therefore, de Ribes' bag is not immediately available, and hæmorrhage persists in spite of plugging, bipolar version must be performed without delay.

Central Insertion.—With a centrally inserted placenta the probability of the child's surviving is a small one, and the life of the mother, which is the paramount consideration, depends on the activity or otherwise of the uterus and on the treatment adopted.

The cervix must be handled with the greatest gentleness for the reasons already given, and if the bag, or the two fingers necessary for bipolar version, cannot be easily introduced, it must be slowly dilated by Hegar's dilators or laminaria tents, or the vagina must be plugged. Barnes' hydrostatic dilators, beginning with the smallest size, are recommended by some authorities. To complete the dilatation and arrest the bleeding de Ribes' bag or the half-breech will be necessary, and the former should be chosen, since it does give the child a chance. If the child is dead, or if there is great urgency, the half-breech should be brought down at once. The placenta will probably have to be perforated unless its edge can be easily reached, supposing it is desired to place the bag inside the amniotic sac. Perforation may be necessary also, if Hicks' method is chosen.

In practically all cases the uterus will contract soon after the beginning of the treatment, and labour will be ended spontaneously or by the aid of the forceps. If it does not soon begin to contract, the uterus must be stimulated by external friction and compression, and by the administration, in the absence of mechanical obstruction to labour, of quinine or ergot. In rare instances, 4 or 5 per cent. of all cases of placenta prævia, the cervix is found to be too rigid to be dilated by the amount of force which it is safe to employ. Under these conditions, if the woman has lost too much blood to wait any longer with safety, it would be best to do Cæsarean section when this, for reasons already mentioned, would not increase the risk to the woman. This operation will

be required, of course, if the pelvis is sufficiently obstructed to render it necessary independently of the position of the placenta. If the child is alive, it will be saved. As an alternative to Cæsarean section the cervix may be incised, in cases where it is too rigid to dilate, so as to allow of the introduction of two fingers for the purpose of version. This is in itself an operation of less gravity; but it involves the risk, in unskilled hands, of wounding one of the uterine arteries. If the liquor amnii has drained away and the cervix is undilatable, Cæsarean section seems to offer the best chance to the woman.

Ligation of the uterine arteries has been performed under somewhat similar conditions with excessive blood loss. It is asserted that the bleeding is at once controlled, and the cervix, if it will dilate with further treatment, does so with safety. This method, as far as the writer is aware, has not yet been practised in this country.

CASES OCCURRING WITH THE BEGINNING OF LABOUR.

If the cervix is not sufficiently dilated to admit a finger, it should be dealt with as described above.

Lateral or Marginal Insertion.—There is little difficulty or danger in this case. The membranes should be ruptured. The active uterus will force down the head or the breech, which will effectually compress the bleeding area, and will prevent the further detachment of placenta as far as this is caused by the advance of the whole ovum with an intact amniotic sac.

If, however, the uterus is not active, it must be stimulated mechanically and by drugs, and the forceps applied as soon as it is safe to do so, always supposing there is no obstruction to the passage of the head. In applying the forceps care must be taken not to include the edge of the placenta between the head and a blade. The uterus must be supported externally during extraction.

If the child is in the podalic lie and the uterus is inactive, one leg should be brought down and slight traction made on it to check bleeding.

Central Insertion.—Even when the uterus is active there is not much chance of saving the child, and the mother, who is in considerable danger, must be made the first consideration. The treatment is identical with that for cases occurring before labour has begun.

Post-partum Hæmorrhage.—After delivery, when it might reasonably be supposed that the danger was over, there is still the risk of bleeding due, on the one hand, to laceration of the cervix,

and on the other to the uterine atony caused by the previous blood loss and the unretracted state of the lower uterine segment. If the cervix is lacerated, it should, if possible, be sutured; but when this cannot be done it must be firmly plugged for a few hours, the plug being inserted into its cavity as well as into the vagina. The greatest care must be taken to support the uterus from the abdominal side during its evacuation and afterwards, so as not to allow of its being re-distended with blood. A close watch must be kept on the patient for some hours after delivery, and if a rapid pulse persists and signs of exhaustion are present, a saline infusion should be given.

Syncope.—The profuse loss of blood which has taken place may cause a fatal syncope, even some hours after all bleeding has ceased, and even though little has been lost during and after the third stage. The medical attendant must be prepared to stay with the patient for some hours in all cases, and to employ intravenous or intracellular infusion on any threatening of collapse. The head should be lowered and external warmth maintained.

EPITOME OF TREATMENT OF PLACENTA PRÆVIA.

If the Uterus is not Contracting.—(1) Stimulate the uterus and dilate the cervix; (2) relieve shock; (3) insert de Ribes' bag or do bipolar version; (4) assist delivery, if necessary; (5) if the cervix is undilatable and the case severe, do Cæsarean section.

If the Uterus is Contracting.—(1) Rupture the membranes, if possible; (2) if not, treat as above.

Watch for Post-partum Hæmorrhage and Syncope.

W. R. DAKIN.

PROLAPSE OF THE PREGNANT UTERUS.

THIS is a rare occurrence, because pregnancy seldom occurs in a badly prolapsed uterus. It only requires treatment, as a rule, in the first three or four months, because after that time the uterus rises above the pelvic brim and its size prevents descent. Should the condition arise, the proper treatment is, first, replacement of the gravid uterus, by pushing it up into the abdomen with the fingers, grasping the lower segment through the vaginal walls. After replacement the uterus must be kept in place by a pessary, preferably a ring. The success of this treatment depends upon the size of the vaginal outlet, for in some cases this is so large that a ring pessary will not remain in place, coming out on any straining. Rest in bed is very important in such a case, and will alone cure the condition, if the patient can be persuaded to remain there until the uterus is large enough to remain above the brim. If necessary, the foot of the bed can be raised on blocks, or the patient may be kept on her back with the hips elevated on pillows.

If the patient cannot be kept in bed and a ring is useless, a cup-and-stem pessary may be temporarily used, being kept in place by rubber bands and straps fixed to shoulder braces. If ulceration from pressure upon the cervix or vaginal walls has occurred, healing may be promoted by rest in bed and plugging the vagina with absorbent wool soaked in glycerine.

If the cervix has lengthened and hypertrophied along with the prolapse, it should be left alone, but may occasionally require incision during labour on account of difficulties in the dilatation stage. No amputation operation should be performed during pregnancy, as it would almost inevitably be followed by abortion.

THOS. G. STEVENS.

PROLAPSE OF THE VAGINA IN PREGNANCY.

PROLAPSE of the Vagina during pregnancy can only occur as a bulging of the anterior wall with the bladder, cystocele, or posterior wall with the rectum, rectocele. In either case replacement is easy, and if the condition causes any inconvenience a ring pessary will, as a rule, suffice to keep the parts in place. The same remarks apply here, however, as in prolapse with a widely dilated vulval orifice.

During labour prolapse of the anterior vaginal wall in front of the presenting part is not an uncommon occurrence. The whole bladder sometimes prolapses with the vaginal wall and may become distended with urine, necessitating the passage of a catheter before reduction can be attempted. If the bladder is empty or does not prolapse, the proper treatment is to gradually push up the vaginal wall above the presenting part between the uterine contractions, holding it up in place during the contractions. This is not always easy, because the parts may become very œdematous and the anterior lip of the cervix may be dragged down with the cystocele. As a rule, a little steady pressure will suffice to push the parts up, a proceeding which is very necessary, as there is a danger of sloughing if prolonged pressure by the fetal head is brought to bear on the prolapsed parts.

THOS. G. STEVENS.

PRURITUS VULVÆ IN PREGNANCY.

PRURITUS VULVÆ occurring during pregnancy is a very intractable condition, and usually depends upon three factors for its causation, namely: (1) increased vascularity of the vulva; (2) cervical and vaginal discharge of an irritating nature; (3) bacterial growth owing to increased secretions in general, which provide a suitable medium for the growth of organisms. All causes of pruritus, however, may act with increased virulence during pregnancy, for the treatment of which *see* Pruritus (Vol. III.). Naturally, nothing can be done to mitigate the increased vascularity unless there is prolapse of the uterus with consequent venous obstruction.

A pessary in such a case may do something to relieve the congestion. Vaginal discharges should be treated in the simplest possible way by astringent douches, the best of which is alum (in the strength of ʒj to ℥j). This should be used lukewarm, remembering the possibility of hot douches setting up uterine contractions. As a disinfectant douche lysol (in the strength of ʒj to ℥j of water) is very useful, being non-poisonous and not irritating in this strength. Iodine douches (ʒj of tincture of iodine, to ℥j of water) [U.S.P. 20 min. of tincture of iodine, to ℥j of water] will sometimes prove a more efficient antiseptic and give relief where lysol fails. It is wiser not to apply any strong caustic applications to the cervix during pregnancy, as there is always a risk of setting up uterine contractions and abortion thereby. The vulva itself requires energetic treatment as a rule; first, that it may be thoroughly disinfected, and then that the intense itching may be relieved. As a disinfectant for the vulva 1 in 1,000 corrosive sublimate may be used with great advantage, and it is better to carry out one thorough disinfection as if for an operation than to give the patient the lotion to use herself. First, the vulva should be swabbed with ether soap for cleansing purposes, and then all parts should be swabbed with the corrosive sublimate lotion, paying particular attention to all folds and corners. This cannot be done very frequently, as even from the vulva there is a danger of poisoning from absorption when strong solutions are used; very often one thorough application suffices. After disinfection an ointment gives most relief, as a rule, and is more easily applied than lotions or powders. Calomel ointment is very efficient, and

should be thus prescribed: *R.* Calomel., gr. 30; Lanolini, Paraffini Mollis, aa zss . *Fiat unguentum.* This should be freely smeared all over the vulva, a piece of sterile wool or scorched rag being used for the purpose rather than the fingers.

Some patients get more relief from 5 per cent. carbolic acid ointment, made rather stiff with lanoline, than with the calomel ointment. These two applications form the chief stand-by in these cases. No doubt other ointments may give good results (*see Pruritus, Vol. III.*), but in the writer's experience these rarely fail if the disinfection is first properly carried out. In very intractable cases hydrocyanic acid lotion (*Acid. Hydrocyanic. Dil., B.P., m10, Aquam ad 3j*, makes a useful strength) applied on sterile lint rarely fails to give relief. It is, however, a very poisonous application, and there is some, but not a great, danger of absorption in the pregnant condition owing to the increased vascularity.

THOS. G. STEVENS.

RETROFLEXION OF THE PREGNANT UTERUS.

THIS condition, which is always accompanied by retroversion, has important effects, the chief of which are retention of urine and abortion. It is important, therefore, that treatment should be adopted early to prevent these two complications. When retention has occurred, the first step in treatment is to empty the bladder by a catheter. The stretching of the urethra and vesical neck which occurs, often requires the catheter to be passed further in than usual before the urine will flow. The uterus, naturally, cannot be replaced before the bladder is emptied. In neglected cases retention with overflow occurs and the bladder may become infected, and its mucous membrane has been known to slough, toxæmia or even septicæmia resulting. In such a case the bladder must be kept empty by a catheter, and must be washed out twice daily with a saturated solution of boracic acid or with 1 volume per cent. of hydrogen peroxide. If the case is a very serious one, with septic symptoms, an incision should be made into the bladder *per vaginam* and constant drainage provided for, but such a course of treatment is very rarely necessary. In ordinary cases, when the bladder has been emptied, the next step is to replace the retroverted uterus. In most instances this can be done at once bi-manually.

With the patient on the left side, with the hips raised, the uterus is pushed up from the posterior vaginal fornix with the finger until the external hand is able to catch the fundus and antevert it. The genu-pectoral position often is of great assistance in this manœuvre, and in some cases it is easier to push up the fundus with the finger in the rectum instead of in the vagina. It is clear, however, that the amount of pressure used must not be excessive, because any rough manipulation of the uterus is always liable to start hæmorrhage and abortion. A useful procedure which is devoid of risk is to fix the cervix with a tenaculum and draw it down in the axis of the vagina whilst pushing up the fundus posteriorly. This is borne quite well by patients without an anæsthetic, very little pain being caused by it; it is, however, but rarely necessary.

There is no doubt that it is essential to replace the uterus at once, if possible, especially in the case of hospital out-patients, who cannot be seen every day. Occasionally an anæsthetic is necessary for the operation of replacement, usually on account of nervousness

or great sensitiveness of the patient. In this event great care must be used not to put forth too much force, as abortion is, without doubt, sometimes thus started. Sometimes these gravid uteri will right themselves, especially if the bladder can be kept empty and the patient kept in bed lying on her side or face (Herman), but it is obvious that for this happy result to occur the patient must be under constant observation either by the doctor or a nurse who can pass a catheter. In cases where no retention of urine has occurred it is usually much easier to replace the uterus, because it is smaller in size and more freely movable. If it cannot be easily replaced under such conditions, according to Sinclair the uterus will replace itself if the patient is kept in bed on her side and a large ring pessary is placed in the vagina. The traction of the pessary on the vaginal walls and cervix tends to make the uterus assume its normal position at right angles to the vagina.

In all cases after replacement it is wise to put a ring pessary into the vagina to keep the uterus in place and to prevent a recurrence of the displacement. The ring should be of such a size as to just distend the vaginal walls without causing the patient any pain. It should be removed when the pregnancy has advanced to five months.

According to Herman, there should never be any necessity to induce abortion in these cases or to draw off the liquor amnii by trocar, as the uterus can always be replaced by one or other means, and this is certainly the usual experience. Very rarely the retroverted gravid uterus is held down by adhesions, a difficult condition to diagnose, usually the result of salpingo-oöphoritis, and implying that one ovary and tube are unaffected. Such a condition would be suspected if all means failed to reduce the displacement even under anæsthesia. In such a condition the only treatment possible is to open the abdomen, set free the adhesions, and replace the uterus from within, putting a pessary into the vagina to prevent recurrence.

THOS. G. STEVENS.

SYPHILIS IN PREGNANCY.

SYPHILIS in relation to pregnancy requires treatment from two points of view, namely :

Maternal Syphilis acquired before pregnancy, or acquired sometime during pregnancy or at the time of conception, and Foetal Syphilis, resulting in abortions, the result of latent syphilis in the man. In the latter case the mother shows no syphilitic lesions, but probably suffers from infection in an attenuated form, and thereby acquires immunity.

Maternal Syphilis acquired before pregnancy requires treatment on the usual lines, so that in the event of conception abortion may be prevented. Should conception occur, the anti-syphilitic treatment must be continued all through pregnancy, with the usual precautions with regard to salivation. It is usual to give mercury by the mouth in the form of Pulv. Hydrargyri c̄ Creta, with small quantities of Dover's powder, according to the state of the bowels. Previous to conception the more modern methods of treatment by mercurial injections may be used if the patient will submit, but the older mouth administration is commonly used during pregnancy. The results of this are quite good, and there seems to be no real reason for subjecting the already harassed pregnant woman to the undoubted trials of mercurial injection.

Syphilis acquired at the time of conception or during pregnancy is apt to be a very serious affection and virulent in type, attended by very luxurious local vulval lesions. Some local treatment in addition to the internal administration of mercury is, therefore, usually required. Lotio Nigra [U.S.P. R. Hydrargyri Chloridi Mitis, 0·70; Glycerini, 5·00; Mucilaginis Tragacanthæ, 2·50; Liquoris Calcis, 100·00] may be used to apply to the primary sore or to condylomata, or if a dry method of treatment is preferred, the lesions may be dusted with calomel and oxide of zinc, in equal parts. Internally, Hydrargyrum c̄ Creta, gr. 1, with Pulv. Ipecacuanhæ Composita, gr. 1, is given in the form of a pill three times a day. This treatment must be continued throughout pregnancy, as abortion is liable to occur if infection occurs early. In late infections abortion or premature labour usually does not occur, and the foetus may escape altogether. Rest in bed may be a very important adjunct to the treatment, especially if local lesions of the vulva or throat are severe.

Fœtal Syphilis, due to latent syphilis in the father, is one of the common causes of repeated abortion, and, therefore, requires energetic treatment. If possible, the father as well as the mother should receive anti-syphilitic treatment before conception occurs. In the mother's case treatment must be used as if the affection were a tertiary one, a combination of mercury with iodide of potassium being given throughout pregnancy by the mouth. A prescription which has been found to answer well is : *R. Potassii Iodidi*, gr. 5 ; *Liquoris Hydrargyri Perchloridi*, ʒj ; *Infusum Quassiae*, ad ʒj. [U.S.P. *R. Potassii Iodidi*, gr. 5 ; *Hydrargyri Chloridi Corrosivi*, gr. $\frac{1}{8}$; *Infusum Quassiae*, ad ʒj.] *Misce. Ter. die sumendum.*

This mixture very rarely causes salivation, but naturally a watch must be kept for this. As the mother shows no local lesions in this condition, no further treatment is required.

THOS. G. STEVENS.

TUBAL PREGNANCY.

APART from all contentious matter concerning the causes of tubal pregnancy, it is admitted that the lodgment and continued growth of a fertilised ovum (öösperm) in the Fallopian tube furnishes some of the most dramatic cases which medical men have to face. The most striking clinical feature connected with tubal pregnancy is the rapid way in which the life of a woman with a gravid Fallopian tube is sometimes terminated by hæmorrhage. As these accidents happen to married women in the prime of life many of them are domestic tragedies.

EXPECTANT TREATMENT.

The clinical aspects of tubal pregnancy vary according to the stage at which medical advice is sought. I am satisfied that a Fallopian tube sometimes becomes gravid and expels the öösperm through the cœlomic ostium into the pelvic cavity within a few days of its formation. This happens with only trifling discomfort to the patient and accompanied with transient pains which are covered by the convenient term "colic." I am sure that a woman may conceive in a Fallopian tube, the pregnancy progress for two or three weeks and then abortion occur, whereby the products of conception, in the form of a mole, are extruded into the recto-vaginal pouch accompanied with a pint of blood. If this amount is not exceeded, and the mole is completely extruded, such a condition is recoverable on the expectant mode of treatment, for the blood will be slowly absorbed and the tube return to its normal condition, like the uterus after delivery. There are reasons for the belief that the tube may again become gravid. That a tube may abort and the patient survive is proved by the fact that in the course of an operation for removal of a gravid tube, a mole, from a previous tubal conception, has been found sequestered in the pelvis. Three such cases have come under my own notice.

The chief objection to the treatment of early tubal pregnancy by the expectant plan, which means keeping the patient in bed for many weeks in order to promote the absorption of the effused blood, is the great liability that there will be a recurrence of the bleeding, especially when the mole is retained in the tube. On many occasions I have had patients placed under my care who

have been treated on the expectant plan by obstetricians, and I have found it necessary to operate and remove liquefying moles and encysted collections of sanguineous fluid.

It may be fairly stated that many gravid tubes burst, or abort, especially the latter, and cause a moderate amount of disturbance which rest will cure. There remains a very large number of cases in which operations are needed to save the patients from bleeding to death. In a fair proportion of cases it is true that though life is not greatly imperilled, operative interference reduces convalescence from many months to a few weeks.

OPERATIVE TREATMENT.

In actual practice the treatment of tubal pregnancy and its complications depends in some degree on the symptoms and the



FIG. 1.—A gravid Fallopian tube with a hole in the wall of the gestation sac. From a woman who died in ten hours from hæmorrhage. (St. Bartholomew's Hospital Museum.)

stage to which the pregnancy has advanced. There are, however, some paradoxical conditions worth consideration in relation to this matter. Many years ago, before it was known that a fertilised ovum, a few days old, could rend the walls of the tube in which it was lodged and cause death from loss of blood, a woman was admitted into St. Bartholomew's Hospital in the seventh week of her tenth pregnancy; she had been seized with acute abdominal pain and died in ten hours. At the *post-mortem* examination her belly was found filled with blood, and a small rounded body occupied the Fallopian tube. This body, about the size of a ripe cherry, had a rent in its walls; through this gap tufts of chorionic villi projected.

At the time this specimen was obtained nothing was known of the early stages of tubal gestation or of tubal moles.

The important fact in connection with this specimen is the clear evidence it affords that a small gestation sac may burst and destroy life in a few hours from hæmorrhage.

The history of this case may be compared with the following:

A married woman was seized in the middle of the night whilst in bed with acute pelvic pain. A doctor was summoned and believed the trouble to be due to the bursting of a gravid tube. I saw the patient six hours later and could not decide whether the trouble depended on a pregnant tube or the perforation of a pelvic appendix, especially as the temperature was 101° F. Ten hours later I opened the abdomen: the pelvis was filled with blood, and as I drew the right Fallopian tube into my hand it was actively discharging blood from its coelomic ostium; even while I watched it the tube contracted and expelled the mole. I removed the ampulla of the tube only and the patient quickly recovered.

It is perhaps worth while to draw attention to the fact that, in this instance, I only removed the outer segment (or ampulla) of the tube. It was wise to do this, for experience teaches that if a small tuft of villi is left in the tube, slow bleeding or even a "tubal blood-drip" will continue, hinder convalescence, and necessitate an operation. Fragments of villi retained in this way are sometimes called chorionic polypi. It is a satisfactory experience, from the point of view of treatment, to realise that when an oöspERM is arrested in the tubal ampulla it is not necessary to sacrifice the whole tube and the associated ovary.

The clinical manifestations of tubal gestation are bewildering in their variety and degrees of severity. These features react on the methods of treatment. A woman aged thirty-five, mother of one child, complained of pelvic pain and wished me to remove her left ovary. This I refused to do, but suggested that another pregnancy would do her more good. A few months later she was reported to have had a miscarriage. One month later I saw her again concerning the pelvic pain, and on examination could feel a lump in the right side of the pelvis. Surgical intervention was now inevitable. At the operation I found blood clot in the pelvis; at the junction of the tubal isthmus with the cornu of the uterus there was a gestation sac widely rent. The supposed uterine abortion with which she was accredited three months previously was an early tubal pregnancy.

This observation interested me extremely. Here was an instance of a gestation sac situated in the most dangerous area of the tube,

and where, when the sac bursts, fearful bleeding usually occurs, yet in this instance its rupture had produced the limited disturbance associated with an early uterine abortion.

Experience teaches that many cases of early tubal pregnancy which terminate by bursting, or abortion, are mistaken clinically for early uterine abortions and treated under this impression.

On many occasions women have been dilated and curetted for retained products of conception causing uterine bleeding when they were really the victims of a tubal pregnancy. In such patients

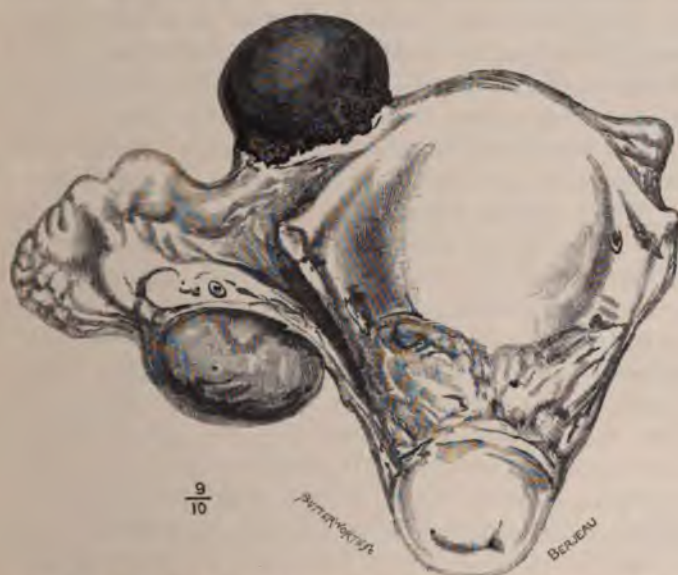


FIG. 2.—Uterus with right Fallopian tube and ovary. The gestation sac involved the isthmus of the tube. The sac ruptured, but the accident only produced a moderate disturbance which was attributed to an early miscarriage.

the supposed products of conception which the medical attendant has raked out of the uterine cavity are really fragments of decidua. The bleeding from which such women suffer is in part due to the separation of the decidua, but much is due to blood which trickles into the uterus from the gestation sac through the uterine orifice of the tube.

Concurrent Tubal Pregnancy and Uterine Pregnancy.—This is an awkward complication. In many cases the tubal sac ruptures early. The symptoms of this accident simulate those produced by the twisting of the pedicle of an ovarian cyst, or the acute form of red degeneration of a uterine fibroid. In the course

of the operation the true condition is detected. The proper treatment for this complication is removal of the gravid tube. Cases have been reported in which the uterine pregnancy has not been disturbed either by the bursting of the tube or by the operation, and continued uninterruptedly to term.

The gravest conditions are those known as "compound pregnancy" in which an intra-uterine and an extra-uterine pregnancy run concurrently to term. In the majority of cases this conjunction has involved the death of the mother. The combination is not invariably fatal, for Ludwig had the satisfaction in such a case to remove the extra-uterine child; the intra-uterine child was delivered naturally; the mother and both children survived.

A rarer combination with an equally happy result was reported by Menge. A pregnant woman was supposed to have an ovarian cyst. This was removed, but it contained a living fœtus nearly at the full term of gestation. In due course the uterine child was born. When Menge reported the case (1907) the mother was suckling both children. These are interesting experiences, because, as a rule, extra-uterine fœtuses, even when they progress to full term and are extracted living, rarely survive their delivery more than a few weeks.

Extra-uterine Pregnancy Complicated with Fibroids.—It is well known that women with fibroids in the uterus often conceive, a condition never desirable, and one often attended with disaster to the fœtus, and it occasionally entails the death of the mother. Fortunately it is rare that fibroids of the uterus complicate extra-uterine pregnancy, and the records of the few cases available indicate, in no uncertain way, that this combined condition has puzzled expert gynæcologists. It has become an axiom in the diagnosis of pelvic swellings that *a gravid Fallopian tube often simulates a uterine fibroid*, and the converse of this is true; *a fibroid in the wall of a gravid uterus in the state known as red degeneration is often mistaken for a gravid Fallopian tube*.

These points are important to bear in mind; the proper treatment is to open the abdomen, inspect and deal with the offending parts according to the conditions found. In one instance an expert gynæcologist, dealing with an extra-uterine pregnancy complicated with fibroids, considered it to be an incarcerated gravid uterus, and endeavoured unsuccessfully to reduce it under an anæsthetic. These cases usually require hysterectomy. Fortunately they are uncommon.

Risks of Operation.—The accumulated experience of the last twenty years teaches that when it is fairly evident a woman

has a tubal pregnancy it should be treated surgically without delay. In order to afford some notion of the risks attending the surgical treatment of extra-uterine gestation, the following facts will serve :

From 1896 to 1907 (both years inclusive) 116 operations were performed for this condition in the Chelsea Hospital for Women. All varieties of tubal gestation were encountered (ampullary, isthmial and tubo-uterine), including the rare condition of a full-time living foetus among the intestines, and the rarer form, a full-time cornual pregnancy. There were four deaths in the series, one in 1897, 1902, and two in 1905.

Troubles with the Decidua.—It is necessary to draw especial attention to a clinical feature associated with early rupture (or abortion) of a gravid tube which leads men astray in diagnosis very often, namely, the expulsion of the decidua from the uterus.

When an ovum becomes fertilised it matters not whether the resulting oöspERM (or zygote) is retained in the ovary or the Fallopian tube, a decidua is produced in the uterus. When the tube bursts or expels the products through the cœlomic mouth of the tube into the pelvis, the uterus is disturbed, and eventually expels the decidua. This expulsion may take place within a few hours of the catastrophe or be delayed several days. The decidua is often cast out entire, more often in shreds accompanied with blood. The bleeding is due to the separation of the decidua; occasionally blood from the gravid tube at and subsequent to rupture, especially if the mole is retained in the tube, drips into the uterine cavity and is expelled. This irregular bleeding may continue for several days.

The importance of appreciating these hæmorrhages is very great, for very often practitioners mistake them for accompaniments to an ordinary uterine abortion. In many instances I have known men dilate and curette the uterus under this impression and miss the enlarged tube, which is the real cause of the disturbance. Zealous but erroneous treatment of this kind sometimes places the patient in a perilous position, and though curetting is considered a minor operation by many, is extremely liable to end in a major disaster.

It has happened that a woman has had a gravid tube safely removed by operation. Later, septic symptoms supervened and an offensive discharge issued from the uterus. It was discovered that an unusually large uterine decidua retained in the uterus had become septic. This was removed by the curette and the woman speedily improved.

It happens that experienced gynecologists are sometimes puzzled to decide, when a patient suffers from uterine bleeding, whether the trouble is due to an early uterine abortion or from the bursting of a gravid tube. In these circumstances, if any shreds of tissue are expelled from the uterus they should be examined. If they are fragments of chorionic villi the condition is due to uterine abortion, and the treatment required is the evacuation of the uterus under an anæsthetic. When the expelled tissue consists of pieces of decidua, the disturbance very probably depends on some change in a pregnant tube. In at least one reported case a gynecologist, finding a thick decidua cast out by the uterus, performed cœliotomy, expecting to find a gravid tube. The tubes were normal.

On two occasions, where there were great difficulty in determining whether symptoms indicated the existence of internal bleeding, due to tubal pregnancy or otherwise, I adopted the following plan: The patient was anæsthetised and the vagina rendered antiseptic; with a pair of scissors I made a small opening in the posterior vaginal *cul-de-sac* and introduced my finger. The pelvic organs were normal; the opening was closed with a suture. This simple measure saved the patient the inconveniences and risks of an unnecessary cœliotomy.

Conditions Simulating Rupture of a Gravid Tube.—The recognition of tubal pregnancy in any of its stages depends on what may be called the proclivities of the medical attendant. Those who have devoted close attention to pelvic disease in women will detect the condition much quicker than men who have been trained in general surgery. Very many patients present the symptoms of acute abdominal disease in which it is difficult to decide whether the accident is due to the rupture of a gestation sac, acute torsion of the pedicle of an ovarian cyst, an impending miscarriage; a stone impacted in the ureter, perforating ulcer of the stomach, duodenum, gall-bladder, or vermiform appendix, volvulus of the intestine, strangulation of a piece of intestine, or irritant poisoning.

Abdominal section has been performed under the impression that the patient's illness depended on one or other of these accidents, and the true condition recognised when the pelvic cavity was found filled with bright red blood.

The periodical medical literature of the last twenty years (1899—1910) abounds in records illustrating these diagnostic difficulties.

Those who have had opportunities of seeing young women brought in a few hours to the brink of the grave (as the records

of coroner's courts testify) by free bleeding, the consequence of the rupture of a gravid tube, can never forget the typical appearances such women present. There is sudden pain in the abdomen, as of something giving way, followed by faintness, collapse, coldness, pulse scarcely perceptible at the wrist, and sighing respiration. Such desperate conditions require decision and promptitude. It is a fortunate circumstance that even in the most fulminating cases some hours are required for bleeding to end fatally. This allows time for the surgeon to interfere. In 1897 I was urgently summoned to a young married woman for what the doctor in attendance correctly appreciated as internal bleeding from the bursting of a gravid Fallopian tube. On reaching the house I found the woman presenting a typical picture of one dying from profuse loss of blood, and the pulse could not be felt at the wrist. I took a scalpel and opened the abdomen as the patient lay in bed; blood rushed out as though an aneurysm had burst. The gravid tube was seized and clamped. We then made our preparations, chloroformed the woman, and deliberately completed the operation. She recovered, subsequently conceived in the uterus, and became the happy mother of a living child.

Transfusion.—In my early operations for hæmorrhages due to rupture or abortion of gravid tubes I used to resort to intravenous transfusion of saline solution. As a rule, 3 pints of the fluid were introduced, commonly through the median basilic, and occasionally in the long saphena vein. Increasing experience taught me that this is rarely necessary. At the completion of an operation, if the pulse is appreciable to the finger at the wrist, intravenous transfusion is not required, but good effects follow the injection of 5 to 10 oz. of saline solution (a teaspoonful of common salt to a pint of water) into the rectum at intervals of two hours. Rectal injections are preferable to subcutaneous transfusion, for these measures are invariably carried out in a hurried manner, with imperfect preparation of the skin, so that the method leads, in many cases, to troublesome abscesses.

Diagnostic Doubts.—When a woman comes under observation with an unruptured gravid tube it is the duty of the surgeon to operate and remove the tube; it spares the patient the distress and danger to which she is liable when bursting or abortion occurs, for one or other of these events is the almost certain concomitant of tubal pregnancy. Interference of this kind depends on accurate diagnosis, and many examples of this have been recorded. The removal of a gravid tube before rupture is one of the safest operations performed on the internal pelvic organs of women.

The conditions which give rise to greatest difficulty in regard to treatment are those where the symptoms and signs favour a presumptive diagnosis of tubal pregnancy, but the physical signs in the pelvis are those presented by a Fallopian tube containing pus, or a small ovarian tumour, especially a dermoid.

In any of these conditions operative interference is the wise course, and accuracy in forecasting the exact condition is only a vain conceit. In order to show how accurate diagnosis is sometimes difficult to attain I may mention that a woman was brought to me by her medical attendant on account of a swelling in her pelvis which he regarded as a gravid tube. He was well qualified to form an opinion, for his practice was in a poor but populous district in London, which, in the course of ten years, had furnished more than a score of cases of tubal pregnancy; my friend had operated on them all and with success. Knowing well his experience I was cautious in forming an opinion. The patient had missed a menstrual period; complained of pain in the pelvis; and on examination I perceived with the finger a swelling which, in size and contour, resembled a tennis ball. The history of the patient indicated the presence of a tubal pregnancy, the physical signs were those of a gravid tube. I recommended the removal of the swelling. Coeliotomy was performed and an enlarged ovary removed. This ovary contained an embryo in a sac, corresponding to the third week of gestation.

The class of case which causes difficulty or doubt as to the right course to pursue is that in which abortion or rupture of a gravid tube gives rise to bleeding either into the peritoneal cavity or in the tissues of the broad ligament. The effused blood is moderate in amount and insufficient to cause symptoms which indicate that the bleeding directly threatens life. In intra-peritoneal effusions, especially those which happen slowly, the blood becomes confined by adherent intestines and omentum, or becomes surrounded by a capsule. The question is often asked, Is it safer for the patient to run the risks of an immediate operation or wait a few weeks with the hope that the blood will be absorbed? I believe the best course is to remove the damaged tube through an incision in the abdomen.

The Treatment of the Non-gravid Tube.—In an operation for the removal of a gravid tube it has often been suggested that the opposite Fallopian tube should be removed also, as a protection against the recurrence of the accident. With our present knowledge, it may be stated that pregnancy is liable to occur in the opposite tube in 5 per cent. of women who have had one **Fall**

tube removed for this condition. The period of liability varies from seven weeks to nine years, but the greater proportion of the cases fall within a limit of four years from the date of the first tube becoming gravid.

Men of ripe experience and sound judgment are averse to sanction the removal of a healthy Fallopian tube for the prevention of repeated tubal pregnancy. Uterine pregnancy is by no means uncommon after unilateral removal of a pregnant tube. The probability of a uterine pregnancy occurring after the removal of a tube for pregnancy is greater than the risk of repeated tubal pregnancy.

Colpotomy.—A large number of successful cases have been reported in which blood effused into the pelvis in consequence of the rupture, or abortion, of a gravid tube has been evacuated through an incision in the posterior *cul-de-sac* of the vagina. This is known as posterior colpotomy. The recovery is usually speedy, and this method of operating avoids the risk of a yielding abdominal scar. The disadvantages of the method are many; the chief objection to it is the limited view it affords of the conditions in the pelvis. Many cases come under observation in which tubal pregnancy is complicated by cysts of the ovary, uterine tumours and the like, which could not be dealt with through a small incision in the vaginal wall. Colpotomy is a method having a limited application.

Hysterectomy in Tubal Pregnancy.—It is occasionally necessary in operating for tubal gestation, and in those rare cases in which pregnancy happens in the rudimentary horn of a so-called unicorn uterus, that the surgeon, in order to carry out an operation successfully, finds it necessary to remove the uterus. Several operators have found that in dealing with interstitial gestation attended with profuse bleeding due to tearing of the fundus that, in order to control the hæmorrhage, it has been necessary to remove the uterus. I have had two such cases.

Unavailing Labour at Term.—The form of extra-uterine gestation which involves the greatest amount of anxiety is that in which the pregnancy goes to, or near to, term, and the patient knows she is pregnant, but is ignorant that the child is not in her uterus. In such conditions a remarkable series of events ensue:—Pains come on resembling those of natural labour, accompanied by a discharge of blood and mucus, and the os uteri dilates. This unavailing labour may last for hours, or weeks, then gradually subsides; as the amniotic fluid absorbs the swelling of the belly diminishes. The fœtus dies and becomes slowly encysted, its amnion is calcified, and nothing but an ill-defined lump persists, and may remain quiescent for fifty years or more.

It happens from time to time that an extra-uterine fœtus progressing to term bursts through the walls of the gestation sac and is extruded with a large amount of blood into the belly among the bowels. When such an accident occurs between the fifth and ninth month of an extra-uterine pregnancy with a living fœtus the bleeding is usually very great and demands prompt surgical action. Such operations are among the most dangerous in the whole range of surgery, for the woman runs a great risk of dying from hæmorrhage, especially when attempts are made to remove the placenta. In spite of this, I believe it is the best practice to open the abdomen by a median sub-umbilical incision, extract the fœtus, and remove the placenta. It is a fact that in the course of an operation for the removal of a living extra-uterine child at full term, the placenta may sometimes be removed entire with a trifling loss of blood. I have had such an experience. When a woman comes under observation with a dead extra-uterine fœtus in her abdomen, or sequestered in the pelvic cavity, the fœtus should be removed, because it is very liable to become infected from the intestinal tract, and this leads to the formation of an abscess. When this bursts externally the patient may recover, often with a fœcal fistula, and this renders her a chronic and miserable invalid. The removal of a dead sequestered extra-uterine fœtus is a simple surgical proceeding if the surgeon does not attempt to dissect out the gestation sac. In such conditions the placenta has disappeared or has become calcified. If the fœtus has become a lithopædion, the surgeon should incise the wall of the sac and remove the fœtus. Should it be an abscess sac containing the skeleton and lanugo, thoroughly remove the fragments and drain the sac; it will soon close. The majority of the women treated in this way recover. When the sac and contents of an old quiescent extra-uterine gestation are removed entire, the proceeding almost invariably costs the patient her life.

JOHN BLAND-SUTTON.

VARICOSE VEINS IN PREGNANCY.

VARICOSE VEINS of the legs and vulva often attain enormous proportions in a pregnant woman, and give rise to great pain and suffering from the stretching of the vessel walls. They, further, are a source of danger from rupture or phlebitis during pregnancy. They, therefore, require treatment for (1) pain, (2) phlebitis and thrombosis, (3) rupture.

Pain is to be relieved, when the veins are in the legs, by bandaging or wearing an elastic stocking. Bandages very often give rise to great discomfort, and some patients cannot wear them. The crêpe Velpeau bandage is the one best tolerated, and it, like any other, should be evenly applied from the foot upwards as high as the veins extend, using just so much stretching and pressure as the patient can bear comfortably. Indiarubber (Martin's) bandages can seldom be used by pregnant women, as they cause so much discomfort from sweating and heat. Stockings sometimes answer better than bandages, but the pressure they exert cannot be so readily adjusted as when a crêpe bandage is used. The operation for removal of varicose veins is not recommended during pregnancy, as these veins almost invariably recover after delivery and do not leave permanent disabilities. There is always a risk, too, that any operation may be followed by abortion, if an anæsthetic has to be used.

In the vulva the relief of pain from veins is much more difficult. There is practically no way by which pressure can be satisfactorily applied to the vulval and labial veins, although an attempt may be made by applying properly constructed pads held in position by a spica bandage, a triangular bandage, or a T-bandage. As a rule, however, relief from pain can only be attained by lying down with the hips slightly elevated, by which means the veins empty and pressure in them is relieved.

Thrombosis and Phlebitis must be treated on the same lines as for these affections in the absence of pregnancy.

Rupture of a varicose vein on the vulva usually occurs during labour from direct injury, and may have most serious results both from external hæmorrhage or from hæmorrhage into the tissues, giving rise to a hæmatoma. External hæmorrhage may be temporarily controlled by pressure of the finger against one of

the bony prominences, but complete and permanent arrest of hæmorrhage is best brought about by under-running the vein with a catgut suture in a curved needle. It may be necessary to tie in this way both sides of the ruptured vein. As a rule, it is impossible to pick up the vein with artery forceps, owing to the very thin walls and close proximity to the vulval mucous membrane. The mucous membrane is to be included in the suture and the knot tied outside it. Asepsis is, of course, essential in this little operation.

Hæmatoma from a ruptured varicose vein may be limited to the vulva, may spread up by the side of the vagina, or may infiltrate the pelvic connective tissue up in the broad ligament. In the two latter situations it becomes a very serious complication of the puerperium. It not infrequently happens that external hæmorrhage occurs as well as a hæmatoma. Not only is the amount of blood then poured out a danger, but infection of these blood masses almost always occurs, leading to suppuration, decomposition and general toxæmia. When a hæmatoma is small and circumscribed and no infection has occurred, absorption is to be expected. Very little can be done to promote absorption, but pain may be relieved by the application of lead and opium lotion. Opinion is divided as to whether these blood collections should be opened and the clots turned out. The risk of infection is very great, and if there is no external opening at all, it is better to leave the mass to be absorbed. It is quite otherwise when there is already an external opening and when infection has occurred. In these cases the only safe treatment is removal of the clotted and decomposing blood, and the provision of efficient drainage. An incision should be made at the spot which is most readily reached. All clots must be turned out, and the cavity drained by tubes and by antiseptic gauze packing. Irrigation with hydrogen peroxide (10 volumes), when decomposition has occurred, will help to disinfect the cavity. It makes no difference what the extent of the hæmatoma is: if it has become infected, it must be opened and drained like any other suppurating cavity. If there is much general toxæmia, or if an actual septicæmia accompanies the lesion, a culture should be made from the cavity, so that a serum or vaccine may be prepared without delay.

THOS. G. STEVENS.

THE MANAGEMENT OF NORMAL LABOUR.

THE requirements of modern surgery necessitate elaborate architectural and instrumental equipment, together with a great deal of personal paraphernalia. There is a marked tendency in modern obstetric hospitals to imitate this elaboration, and to make the attendance on a case of parturition so dependent on a complicated ritual that it can only be carried out in a well-appointed institution. If all this refinement in detail is necessary it is impossible to attend with safety a woman in labour in her own home, and the sooner the public are informed of this fact the better. In fact, it would be impossible for the conscientious obstetrician to attend even the well-to-do in their homes.

The profession are so imbued with the idea that safety lies in architectural detail that there now exists a maternity hospital with labour wards so constructed that no one but the attendants actually engaged in the delivery are in the same room with the patient. The instruments needed are handed through a window by a nurse, who is kept in the instrument room all the time she is on duty. The matron on her tour of inspection does not enter the labour ward, but looks at the patients through a glass partition.

Again, men confuse the convenience of ritual with its necessity. Many obstetricians keep themselves supplied with suits of sterilised clothes, which they send to their patient's houses and wear during the delivery. If definite proof can be produced to demonstrate the necessity of this extreme care, a very serious problem arises for private practitioners and for those in charge of extern maternities. It is inconceivable that a physician with a large maternity practice among the poorer classes could possibly comply with these requirements; furthermore, the maintenance of an extern maternity would be no longer justifiable.

One other effect of this idea is to cause general practitioners to feel that they cannot be aseptic in private practice, and they are discouraged by the apparent inefficiency of the means at their disposal.

Of necessity, under the circumstances that obtain in private practice, the development of an aseptic technique requires considerable forethought and a thorough knowledge of the channels of infection during labour.

The Rotunda Hospital is a building over 150 years old, and from a modern standpoint it would probably be condemned. In the management of labour we strive to assimilate our methods to the conditions in private practice, and there is no step in our technique which could not be carried out in the houses of the very poor. Nevertheless, the results obtained, tested by a temperature table, compare favourably with any published results, either in private practice or in the best and most modernly equipped hospitals. This being so, we maintain that a maternity patient can be delivered safely in her own home, however humble, but to obtain this measure of safety requires disciplined forethought and the development of the aseptic instinct, and no mere mechanical device can compensate for this deficiency.

Those who advocate the methods suggested in this article will be met with the statement that sepsis has ceased to exist in private practice. The writer, as a consultant, sees many cases of septic infection throughout the country. He is almost invariably told that the disease is practically unknown in the district. This is, of course, true, but these statements would also apply to phthisis, and in spite of the supposed rarity of sepsis, the Registrar-General's statistics show that an enormous number of women in the prime of life, at a period when they least can be spared, fall victims to this preventable disease.

In the past teachers of obstetrics failed to point out the undoubted fact that the majority of patients recover, and always did recover, from childbirth, despite carelessness in technique and absolute neglect of aseptic precautions.

Paradoxical as it may appear, the least amount of sepsis may be found in the practice of the casual nurse or doctor, who dislikes obstetrics, and spends as short a period as possible in attending a patient. In such a man's practice it is likely that the poor will escape too great personal attention, with its resultant dangers; but in the neighbourhood there is sure to be found some woman whose social position is such that she may command his full attention from the first. When such a case arises there is great elaboration of the methods to ensure what is termed an antiseptic delivery, yet it is certain that a man who has not previously practised the art of cleanliness will fail to attain it in a given case, and the patient in good social position is less safe in his hands than the poorest cottager he attends.

In hospital practice, in spite of the greatest care, $2\frac{1}{2}$ per cent. of patients show morbidity. In the writer's private practice this percentage is still higher. He never attends save in conjunction

with a well-trained nurse, who is forbidden to make vaginal examinations. As a rule, he makes no vaginal examination, and when it is necessary to make one he always wears a sterilised rubber glove. Despite this fact the results in his private practice are not as good as those obtained in the hospital. The fact that basins, jugs, bedpans, mackintoshes, pads, etc., are not so thoroughly disinfected accounts for the higher morbidity in private practice. Yet men of unimpeachable honour have repeatedly stated that they can and do attend midwifery for years without ever seeing a temperature above normal. If there is any general practitioner who can collect a hundred consecutive cases with a morbidity, estimated by the British Medical Association standard, of under 4 per cent., that is, one case in twenty-five, he should undoubtedly publish his methods and statistics, as they would be the best in the world. To ensure asepsis when managing a labour case requires forethought and method in the preparation of the room, the bed, the instruments and utensils used. The attendant's hands and the patient's vulva also require careful disinfection.

The obstetrical bag may contain the minimum of instruments with which to manage safely, or it may be burdened with materials for operations, indications for which are unlikely to arise in private practice.

The best bag is made of cowhide of a size to fit on a bicycle carrier. The linings should be made of holland, and so put in that they can be readily removed and sterilised. A fitted lining which buttons in is most convenient. It contains several pockets of various sizes to accommodate bottles and small instrument cases. Any trunk manufacturer will supply such a bag at less cost than an instrument maker. There are various forms of combined cases and douche cans supposed to have advantages over the ordinary obstetrical bag. They are objectionable in that if they are not packed tight the instruments rattle, while the weight of the case is always much greater than that of the bag, and it cannot readily be fitted with receptacles for bottles. Very often it is necessary to carry a bag as well as the case. These disadvantages outweigh any supposed convenience accruing from its use as a douche can, particularly as the Rotunda syphon douche answers every purpose and can be carried in the bag.

The following list¹ contains everything likely to be used. They will all fit easily into the bag. Instruments for special operations, such as perforation, can be sent for if needed:

(1) Barnes' forceps with Neville's axis tractor; (2) Martin's needle-holder; (3) Large and small curved needles for perineum

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and cervix ; (4) Large and small Bozemann's catheters ; (5) Rhein-städter's flushing spoon curette ; (6) Bullet forceps ; (7) A pair of stout, sharp-pointed scissors ; (8) A small pair of scissors ; (9) Plugging forceps ; (10) Two glass vaginal nozzles ; (11) Two needles for infusion under the breasts ; (12) A metal female catheter ; (13) No. 12 or 14 gum elastic male catheter ; (14) Mucus catheter, such as Carton's, for mucus in child's throat ; (15) Baby's silver catheter ; (16) A pocket lancet ; (17) A small trocar and cannula ; (18) Rotunda douche ; (19) Two pairs of rubber gloves ; (20) Two threepenny nail-brushes ; (21) Infusion apparatus kept apart from infusion needles.

These are carried in separate batiste bags, or envelopes which button down, in which they are boiled before being put into the cowhide bag. After boiling them, hold the bags or envelopes upside down to let the water run out, and put them all in a large, dry batiste case.

(22) Catgut, or silkworm-gut sutures in corrosive sublimate ; (23) Chloroform (3 oz.), and Skinner's mask, tongue forceps and gag ; (24) Opium tabloids in bottle ; (25) Sodium chloride solids for infusion ; (26) Biniodide of mercury tabloids in bottle ; (27) Squibb's ergot ; (28) Creolin ; (29) Lysol ; (30) Two Dührssen's tins of iodoform gauze, which are very handy for plugging the uterus or vagina ; (31) A jar of sterile wadding tightly packed ; (32) A hypodermic case with morphine, strychnine, ergotinin, digitalin, cocaine, atropine and scopolamine ; (33) A small bottle of brandy for hypodermic injections ; (34) A small bottle of ether for hypodermic injections ; (35) Stout binder-pins ; (36) A water-proof apron of light material ; (37) A piece of thin waterproof, 3 feet by 4 feet, to form a mackintosh on which the patient can lie, and in which soiled instruments can be wrapped after use ; (38) Soap in a tin. We always carry our own soap. Avoid so-called antiseptic soaps ; they do not sterilise the hands, and they make the skin rough. The soap is used for lubricating instruments or gloves. Soap is made by boiling, therefore if the outer surface is washed off, it can safely be used for lubrication ; (39) Skein of linen thread for ligaturing the cord.

These instruments may be carried sterilised, or a steriliser may form part of the outfit, and the instruments sterilised as needed. The latter plan is not satisfactory. Water in a steriliser takes a long time to boil and this may cause unnecessary delay in urgent cases. A steriliser adds needlessly to the weight and bulk of an already sufficiently heavy outfit. It is much better to carry sterilised instruments in sterile instrument cases, two being required.

An instrument roll case of linen or calico, when laid flat, resembles an opened envelope. It may be sterilised in the following manner if a steam steriliser is not available. After having been boiled, it should be dried in the oven between two sterilised plates. When thoroughly dry it should be laid, the inner surface uppermost, on a clean towel and ironed.

The instruments, boiled in a weak lysol solution, are laid in their appropriate loops on the roll. They dry by their own heat and do



FIG. 1.—Sterile case with instruments.

rust. The edges are folded over and the case rolled up. It could then be wrapped up in a piece of Billroth tissue or other waterproof material. If protected from touch contamination these cases require sterilisation only at infrequent intervals. Air contamination may be disregarded, because septic organisms will be deposited only in small numbers, greatly isolated. If two cases are used, one contains only those instruments employed at a normal delivery, scissors, catheter, needles, mucus catheter and holders. The second contains only such instruments as are needed for complications. It is never opened at a normal

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case. Used instruments are carried back wrapped in a piece of Billroth tissue or the waterproof apron. Gloves, after being boiled, should be dried with a sterile towel and dusted with French chalk, which can be sterilised by baking in the oven. A separate sterilised bag may be used for the gloves, or they may be wrapped up with the instruments. If cared for in this way gloves last a long time, and the lessened risk to the patient more than compensates for the added cost. Rubber goods of all kinds can be preserved indefinitely by keeping them exposed to the vapour of paraffin oil. Contact with the oil, however, corrodes the rubber.

By these means the doctor's personal necessities are carried ready for use and no delay is occasioned by sterilisation at the house, where instruments like forceps can only be sterilised with difficulty, unless a special steriliser is carried.

The room chosen for the delivery should be light and airy, on the sunny side of the house, and should contain an open fireplace. It is desirable to remove all unnecessary ornaments and furniture.

The bed, a single one if possible, situated so as to allow of ready access to both sides, should be placed so that the light from the window will fall directly on the vulva and permit careful inspection. If the bed sags in the middle, this is readily overcome by placing flat boards transversely under the springs. The mattress should be firm and hard. Feather beds are an absolute nuisance and should never be allowed.

When the room and situation of the bed have been chosen the bed is made up as follows:

(1) A hard mattress; (2) Blanket; (3) Sheet; (4) Mackintosh; (5) Draw-sheet. These are all tucked in under the mattress. (6) The binder laid out; (7) A second mackintosh overhanging the edge of the bed, to protect the underlying clothes; (8) Draw-sheet or wood-wool sheet, which must be loose and not fastened by safety pins.¹

The temperature of the room determines the amount of covering. The edge of the sheet should be turned up and pinned to the quilt to enable them all to be lifted at once. A large tin bath is placed under the bed with the mackintosh hanging down into it.

Then arises the question of the bedroom utensils necessary and their sterilisation.

In an ordinary house the boiling of jugs, basins, bedpans, etc., is out of the question. They may be disinfected by thorough scrubbing with soap, water and a boiled nail brush, rinsing with boiling water and immersion until required in a bath containing

1 in 2,000 corrosive sublimate solution. Anything that cannot be boiled should be disinfected in this manner.

When summoned to a woman in labour the cardinal principle of obstetrics is to attend to the call immediately. Neglect of this rule is the cause of many misfortunes. All obstetricians know how often the call is premature or even unnecessary, and how irritating these demands are after a long and laborious day. Obstetric practice is trying at all times, but the more conscientiously we adopt the custom of going when sent for, and the better we know our work, the fewer complications we encounter, and the easier our task.

Even if called during the first stage, and before our presence is actually required, much good may come of the visit, particularly if the nurse in charge is a stranger. After entering the room no time should be lost before examining the patient. By this is meant inspection, palpation and auscultation, not necessarily vaginal examination. Indeed, in a large number of cases, vaginal examination may be dispensed with altogether, sufficient knowledge being gained by external examination.

For ease of palpation there is no doubt that the abdomen should be uncovered. To accomplish this, tact is necessary, as in all other obstetrical manipulations. The author has known a practitioner fall into unmerited discredit by precipitately pulling down the bedclothes. It is well, therefore, before actually palpating, to engage the patient in conversation, eliciting details of pregnancy and labour. Tell her it is important to discover if the child is lying in the right position. To do this palpation is necessary. It is often quite easy to palpate over the sheet or nightdress, and the attempt should always be made. If this is not satisfactory there should be no hesitation in exposing the abdomen, as the patient will then recognise its advisability.

Palpation should always be combined with inspection, which often gives valuable information; for instance, when called in consultation to see a patient who had been many hours in labour, attended by a doctor and nurse who had made frequent vaginal examinations, the author saw immediately on turning down the bedclothes that the uterus had ruptured. The child's foot was visible directly under the skin, sticking up between the separated recti muscles. Again, inspection will reveal the presence of a full bladder, the formation of Bandl's ring, which indicates thinning of the lower uterine segment with threatened rupture of the uterus, pendulous abdomen, gross deformities, and possibly abdominal or pelvic tumours. In this section, dealing with normal labour

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inspection is of value in that it gives mostly negative information, that is, it assures us of the absence of abnormalities. It also combines with palpation to show the height of the fundus and whether or not the uterus has fallen forward.

Palpation.—The patient lies on her back, with her knees drawn up and her feet resting flat on the bed. This relaxes the abdominal muscles. The bedclothes are turned down to the pubes, the chest is covered with a blanket, and the abdomen with the nightdress



FIG. 2.—Palpation, fundal grip (from Galabin and Blacker's Midwifery).

which is subsequently drawn up if necessary. The examiner's hands are warmed before the fire or by immersion in hot water. Attention to these details minimises the difficulties of palpation. To palpate with comfort to himself the examiner sits on the edge of the bed facing the patient and at her right side.

A hand placed on the fundus determines the height of the uterus, and the curve of recession of its anterior surface. If the uterus has fallen forward, as it usually does in a primigravida three weeks before full term, the curve is abrupt, and the hand is laid on the fundus as on a shelf. In a multigravida the uterus may not fall forward until a few days before labour, or at the onset of labour.

On the other hand, a pendulous abdomen, either in a primi- or multigravida, will always cause falling forward of the uterus much earlier in pregnancy. In a normal case, falling forward of the uterus closely coincides with the formation of the lower uterine segment, which has been demonstrated by frozen sections to occur after the eighth month in primigravida. At full term, then, the fundus should be halfway from the umbilicus to the ensiform cartilage and the uterus should have fallen forward.

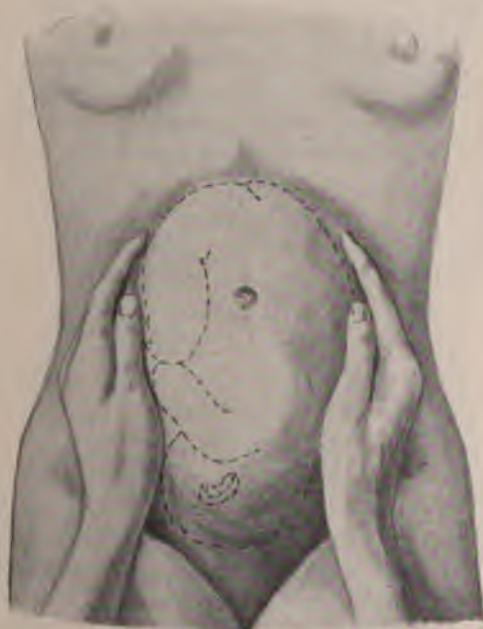


FIG. 3.—Palpation, umbilical grip (from Gatabin and Blacker's Midwifery).

The first position of the hands in palpating to determine the presentation and position of the foetus is known as the "fundal grip." The hands are laid, palms downward, flat on the abdomen, at either side of the fundus. With gentle pressure the palmar aspects, and not the tips, of the fingers, are gently but firmly sunk into the abdominal and uterine walls until they encounter the resistance of the foetal pole in the fundus. After this is accomplished it is advisable to move one hand at a time, steadying the foetus with the other. In a normal case the breech is felt in the fundus, with the back at one side and the limbs at the other. At any time during palpation foetal movements may be felt. The characteristics

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of the breech as felt in the fundus are that it is moved with difficulty or not at all ; the back is continuous, not interrupted by the sulcus of the neck ; when it is moved from side to side, the rest of the child moves with it. The hands should be moved from place to place around the fundus to obtain this information. If there is any difficulty in recognising the part in the fundus, time should not be wasted before passing to the second position or "umbilical



FIG. 4.—Palpation, Pawlik's grip (from Galabin and Blacker's Midwifery).

grip." The name indicates the position of the hands at the side of the uterus. The umbilical grip confirms the findings of the fundal grip, that is, the position of the back and limbs, and possibly the recognition of foetal movements. In passing the hands from grip to grip, the intervening portion of the child's body may be palpated. In the case under consideration, first vertex, the broad smooth surface of the child's back would be felt to the left of the middle line and in front, passing down to the groove of the neck, above the head in the pelvic brim. The limbs are

felt as irregular knobs, which may move under the examiner's hand.

Now comes the most important and useful manœuvre in palpation, "**Pawlik's grip**," by which is best determined what fetal pole presents, and in what position. *Presentation* designates the portion of the child's body that enters or attempts to enter the pelvic brim first, in other words, the lowest part of the fetal body. *Position* refers to the relation between the fetal back and the

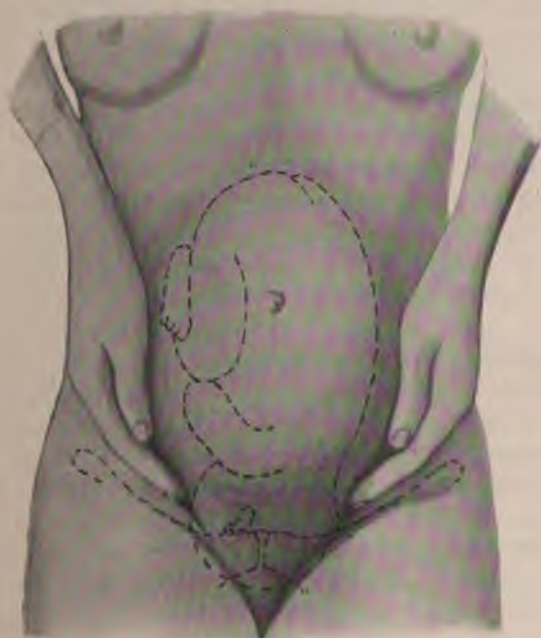


FIG. 5.—Palpation, the pelvic grip (from Galabin and Blacker's Midwifery).

mother's abdomen. *Attitude* refers to the relation of the various fetal parts, head, trunk and limbs. Thus, in a first vertex presentation the portion of the head between the extremities of sub-occipito-bregmatic diameter enters the pelvic brim first, the back of the child is to the left, in front, the head is flexed on the chest, the thighs flexed on the abdomen and the legs on the thighs, the forearms are flexed on the arms and crossed over the breast.

For Pawlik's grip the right hand is used. The fetal pole at or in the pelvic brim is grasped between the thumb and fingers. The

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beginner's mistake in using Pawlik's grip is that he does not sufficiently separate the thumb from the fingers, and only the abdominal wall is pinched up, the presenting part being missed. The fingers should be sunk into the abdominal wall on the patient's left side, above Poupart's ligament, well out towards the anterior superior spine of the ilium, the thumb occupying a similar position on the patient's right side. This necessitates stretching the hand to its utmost. By gradually approximating the thumb and fingers the resistance of the presenting part is encountered. In a normal case it is the flexed head, recognised by its hard, rounded contour, its attitude, and the sulcus of the neck above it. In a first vertex presentation the head engages in flexion with the occiput in front, to the left of the middle line and at a lower level than the face. Therefore, by Pawlik's grip the thumb meets the resistance of the face (brow or chin, depending on the degree of flexion) at a relatively higher level in the abdomen on the patient's right than the fingers feel the occiput on the patient's left. Pawlik's grip gives further valuable information, as to whether the presenting part is fixed in the brim, whether it is fixed by its largest diameter, or only in part, and whether it is presenting normally. If the head is fixed by its largest diameter, it cannot be moved from side to side. If unfixed, the head is freely movable and may override the pubes if the pelvis is small. Abnormal presentations of the head—brow, face, and occipito-posterior—can also be diagnosed by Pawlik's grip. It is stated that the placenta prævia may be recognised by Pawlik's grip, but this is hardly possible.

Sometimes when the head has sunk through the brim into the pelvis it cannot be felt by Pawlik's grip. The examiner then practises the "pelvic grip." He turns to face the patient's feet and sinks the fingers of both hands, one on each side, through the inlet into the pelvic cavity. He will feel the head on one if not both sides of the pelvis. By these two grips, Pawlik's and the pelvic, the progress of the head during labour can be followed without difficulty and with greater accuracy than by vaginal examination, as the formation of a caput succedaneum causes spurious descent of the head.

There is one other method of palpating the head in the pelvis without making a vaginal examination, and it is of especial value when the head is so low that it is reached with difficulty or not at all by the pelvic grip. In such a case if the finger is pressed up into the pelvis in front of the coccyx and behind the anus, the head can be readily felt.

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The Pains.—If during palpation the uterus is felt to contract, but the patient is not conscious of any pain, she is not in labour. On the other hand, if the uterine contraction is associated with pain in the back and in the lower abdomen it is practically a certain sign of the onset of labour. It is not an absolutely certain sign, as a few cases of painful contraction occur which are not accompanied by dilatation of the os.

False pains are very common, usually in association with constipation or the ingestion of purgatives. The fact that the uterus does not contract in conjunction with the pain is diagnostic.

False Labour.—As stated above, these pains may be accompanied by uterine contractions. In addition the cervix may be taken up, the os partly opened, and yet after some hours the symptoms may subside and the patient go several days or even weeks before labour actually starts. This condition of false labour seems to be associated with the formation of the lower uterine segment and separation of the membranes around the internal os. False labour is most common in highly strung, neurotic women.

The other signs of the onset of labour are the "show" and dilatation of the os.

The Show.—This is a blood-stained mucous discharge seen on the vulva when the woman is in labour. It is not always present, but when it is labour has started. During pregnancy the cervix is closed with a mucous plug. This may come away two or three days before the onset of labour and should not be mistaken for the show.

Dilatation of the Os.—This will be considered under Vaginal Examination.

Auscultation.—Inspection and palpation have decided whether normal labour has started, and if foetal movements have been felt, that the child is alive. This latter fact is most surely and easily determined by hearing the foetal heart. To hear the foetal heart requires practice. It should be listened for over the back of the child in all presentations but face. In the uterus the child's lungs are not expanded, and contain no air, and therefore conduct the heart's sounds easily to the back. In all but face presentations the child's back is flexed and closely approximated to the uterine wall, with little or no intervening liquor amnii. For these reasons the foetal heart sounds are conducted through the solid media of uterine muscle and abdominal wall better than they are through the amniotic fluid to the uterine and abdominal wall over the front of the thorax.

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In the first vertex presentation the point of maximum intensity of the foetal heart sounds is about midway between the umbilicus and pubes, to the left of the middle line. In some cases it may be heard over a large area of the abdomen, in others only in a very circumscribed region. In a second vertex presentation the point of maximum intensity is in the same relative position to the right of the middle line. In posterior positions of the occiput, liquor amnii intervenes between the foetus and the anterior wall of the uterus; therefore the heart sounds are heard with difficulty, but as a rule they are perceptible on one or other flank.

The foetal heart sound may be described as a double tick-tack sound with an interval between each double sound. It resembles the ticking of a watch. Sometimes the first sound is very faint or even inaudible, but in the majority of cases, both sounds are heard distinctly and are of almost equal intensity and duration. The normal rate of pulsation varies between 120 and 160.

Uterine Souffle.—In listening over the abdomen confusion may be caused by the presence of a loud blowing sound, synchronous with the maternal pulse. This is the uterine souffle. It is heard on both sides of the abdomen but usually with greater intensity on the left than the right side, on account of the torsion of the uterus. The origin of this sound is undetermined, but its position certainly corresponds to the course of the great uterine vessels.

Funic Souffle.—In 10 per cent. of cases another sound may be heard by listening over the abdomen. This is the funic souffle, a sharp hissing sound, synchronous with the foetal heart. It may take the place of the foetal heart sounds, or may be heard in addition to them. The funic souffle is generally supposed to be due to obstruction in or pressure on the cord and is often an indication of foetal distress.

Thus, in a normal case, by external examination alone, one learns that the child is presenting with the head flexed and fixed in the brim by its largest diameter; that it is alive and showing no signs of distress. Moreover, the onset and progress of labour are determined without making a vaginal examination.

The question is often asked if palpation ever causes any harm. There is no evidence forthcoming to show that the least injury has ever resulted from it.

The Advisability of Making Vaginal Examinations.—If the patient is very stout, if the abdomen is very distended and tense from excessive amniotic fluid, or if the abdominal muscles are kept persistently contracted, very little may be learned from abdominal palpation, thus rendering vaginal examination imperative if

correct diagnosis of the onset and progress of labour is to be reached. In spite of all the knowledge which can be elicited by external examination, it may be desirable to examine by the vagina. Thus, if sent for too early it is often of advantage to know the size of the os, to enable one to make an approximate estimate as to the probable time of delivery.

In this connection it must also be remembered that presentation of the cord can only be recognised by vaginal examination, and at times the failure to recognise this condition is of serious import to the fœtus. This danger has, however, been greatly exaggerated by the advocates of frequent vaginal examinations. Prolapse of the cord occurs only once in every 175 cases (Rotunda statistics). A large number of such cases occur with macerated or premature infants, many of them non-viable. Again, auscultation will demonstrate any danger arising from complications and indicate the necessity for a vaginal examination. Finally, palpation will show non-fixation of the presenting part or abnormal presentation, which are the conditions that predispose to prolapse of the cord. Even in the practice of those who make frequent internal examinations, a large number of prolapses are recognised only when the cord is seen at the vulva. Undoubtedly, however, a small percentage of fetal lives will be saved by early recognition of presentation or prolapse; therefore it is not bad practice to make one vaginal examination during labour, and if the presenting part is not fixed in the lower uterine segment when the membranes rupture, vaginal examination is imperative.

A great living obstetrician has asserted that a woman delivered in the street, unattended, has never died of acute sepsis. In other words, sepsis depends entirely on vaginal examinations. There is no doubt that this is somewhat exaggerated, but in the main it is true, and it points to the great responsibility devolving on anyone who makes a vaginal examination during labour.

Septic germs are found in the air, but infection during labour from this cause has never been proved and is hardly possible because of the constant outward flow of fluids from the uterus and vagina.

The upper portion of the normal vagina is free from septic organisms, but they are constantly found in the neighbourhood of the labia minora. It has been conclusively proved that these organisms can be pushed on to the cervix by the examining finger; therefore patients may be infected even though the hands or instruments used are absolutely sterile. This emphasises the importance of cleansing the vulva before introducing anything into the vagina.

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To Prepare for a Vaginal Examination it is desirable to have four basins disinfected as described. Three are for cleansing the examiner's hands, and the fourth contains pledgets of sterile cotton-wool in an antiseptic solution for cleansing the vulva. The hands are washed with soap and water in the first basin, the soap is rinsed off with plain water in the second basin, and the third basin contains an antiseptic solution in which to immerse the hands. It is necessary to rinse off the soap, as it renders inert corrosive sublimate and also some other antiseptics. If economy in the use of basins is sought, the soap may be washed off by having the nurse pour water over the hands, but they should not be rinsed in the basin in which they have been scrubbed.

The hands should be scrubbed with a nail brush which is sterilised by boiling. The common nail brush used by the household is a source of danger, as it is always septic, and therefore the obstetrician should always carry his own. A cheap brush answers every purpose and stands repeated boiling. Antiseptic soaps have no advantage, as they probably have no germicidal power: they also tend to roughen the hands. A good unscented toilet soap is as efficient as carbolic soap and is much less irritating to the skin. Soap should be carried in a special box. This soap box makes the best rest for the nail brush when it is not in use, and avoids its being placed on a possibly dirty table. The hands are scrubbed in the first basin with soap and water for four or five minutes, the nurse changing the water several times. The time spent should be measured accurately and not guessed. A watch or sand-glass should be used. The nails are kept cut close, and any tags of loose skin cut off with the scissors. In scrubbing pay especial attention to the region of the finger nails and the interdigital spaces. After rinsing off the soap, the hands are immersed for one minute in an antiseptic solution. Corrosive sublimate and biniodide of mercury are the antiseptics in common use. The latter is preferable as it does not roughen the hands or corrode instruments. It is equally good as an antiseptic. It has the disadvantage of being hygroscopic and the tabloids may dissolve in the bag. Tabloids of biniodide or corrosive sublimate are obtainable and the solution of any strength required is readily made. The hands are immersed in 1 in 1,000 solution of either antiseptic for one minute.

Hands disinfected in this or any other manner are not rendered sterile, particularly if they have previously come in contact with septic material; therefore a rubber glove on the examining hand is advisable to ensure asepsis. In putting on a rubber glove its object is defeated if the fingers of the glove are drawn on by the

other hand. If the glove is filled with water, it may be drawn on without difficulty. The hand slips in more easily if it is lubricated with soap. Soap is rendered sterile by the heat employed in its manufacture, and if the outer contaminated surface is washed off with hot water the inner part may safely be used as a lubricant.

Before putting on the glove the vulva is thoroughly cleansed. The patient is placed on her left side with her hips well out to the side of the bed. Several pledgets of sterile cotton-wool are placed in a basin of soap and water, to which a few drops of lysol may be added. The vulva is cleansed by wiping from before backwards, throwing away each pledget after one wipe. In this way one avoids carrying the septic organisms which are constantly found on the perineum and anus forward to the labia. The labia majora are washed first, then separated, and their inner surfaces and the labia minora cleaned in a similar manner. The soap is then washed off with plain water or antiseptic solution. This may be done by pouring the solution over the vulva or by using pledgets of cotton-wool as before. Finally, a pledget of wool, saturated with corrosive or biniodide solution is left between the labia minora until the vaginal examination is made. If the pledgets of wool used to wash the vulva are held in a sterile forceps, the hands need not be washed again.

As the danger in vaginal examinations lies in pushing septic organisms from the vulva into the vagina it is necessary to introduce the finger by sight, and to touch nothing until it is in the vagina. The pledget of cotton-wool is removed, the labia are separated by the fingers of the left hand, and the index finger of the gloved right hand, lubricated with soap or weak lysol solution, is introduced directly by sight. One finger gives sufficient information in an ordinary case, but if there is any doubt two, three, or four may be used. The shorter time the finger remains in contact with the cervix the less injury is done to the protective epithelium.

The First Points to Determine in Making a Vaginal Examination are the condition of the cervix and the degree of dilatation of the os. If the os is open, the unruptured membranes, the presence of the presenting part in the brim, its recognition, degree of fixation and position, may all be learned. Information is also obtained concerning the amount of vaginal secretion and the condition of the perineum.

The condition of the cervix early in labour may differ materially in primiparæ and multiparæ. The external os is closed by circular elastic and fibrous structures. With the onset of labour, or possibly

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before, when the lower uterine segment is formed, the internal os is dilated and taken up into the lower uterine segment. The result of this dilatation and retraction is to shorten the cervix materially, before the external os has been dilated to any great extent. This gives the characteristic knife-like margin to the external os, with complete disappearance of the cervical canal, which is felt when the os is sufficiently dilated to admit one finger. These are the essential features of a primiparous os.

In a multipara, on the other hand, the elastic fibres closing the external os have been ruptured in a previous labour. The external os is closed by the circular muscular fibres. With the onset of labour pains these fibres relax before the cervix is taken up and the finger may be passed through the external os and feel the internal os, demonstrating that the cervix is not taken up. This condition does not necessarily mean that labour has begun, as it is not uncommon to find the cervix opening some days before labour.

When the os is sufficiently dilated, a finger may be passed through it to determine if the membranes are intact. During a pain the convex surface of the membranes may be felt bulging through the os and they are thus readily recognised. Abdominal pressure will usually cause the membranes to bulge, if they are intact, and obviate the delay resulting from waiting for a contraction. Care should be taken not to rupture the membranes during these manipulations. There is sometimes absence of the forewaters, although the membranes are intact around the presenting part. This condition arises from rupture of the membranes high up, through which the liquor amnii escapes. Under such circumstances the child is apt to be born with a caul.

The presenting part is next felt for, no force being used if the membranes are unruptured. If the head is presenting, it is recognised by the presence of sutures and fontanelles. This presents no difficulty, unless a large caput succedaneum obscures the outlines of the bones. In the case under discussion the anterior or large fontanelle, if not too far up on account of the flexion of the head, is felt behind and to the right, the sagittal suture running from it obliquely across the pelvis to the posterior or small fontanelle in front and to the left of the middle line.

In a second vertex presentation the fontanelles occupy the same relative positions on opposite sides of the pelvis; so that the sagittal suture runs from behind to the left, forward and to the right. As position and presentation are made out best by palpation, and as vaginal examination is undertaken only to confirm the findings obtained by palpation, or to discover any abnormality, it

is sufficient for practical purposes to feel a suture. This makes it certain that the head is presenting, and if it were not in a proper position, characteristic features would be recognised. In addition to recognising the presenting part as the head, it should in a primipara be felt fixed in the brim, that is, it cannot be pushed out of the pelvis. In a multipara, on the other hand, it is not uncommon to find the head freely movable above the brim in the first stage, particularly before the membranes rupture.

Incidentally, a full rectum may be felt by vaginal examination. Fæcal masses in the bowel pit on pressure and are not sensitive.

MANAGEMENT OF THE FIRST STAGE.

Once the diagnosis of labour is established, the question of management arises. A well-trained and experienced nurse will not require a doctor's presence throughout the first stage, and to her may safely be left the arrangement of the room, the preparation of the bed and the care of the patient. She should be able to detect any departure from the normal and judge the progress of labour by the character, frequency, severity and duration of the pains. It is not advisable for a nurse attending in conjunction with a doctor to make vaginal examinations.

If a primipara falls in labour late at night, the nurse is instructed to keep her in bed and encourage her to sleep between pains. An order for a sleeping draught may be left with the nurse to be used if necessary. Early in the first stage is the proper time to administer a purgative, the choice depending largely on the patient's inclinations. A purgative is preferable to a laxative.

In the morning the nurse sends a note to the doctor to reach him at breakfast time. She should give the time of the onset of labour, the strength, duration and frequency of the pains, the condition of the bowels and bladder, the amount of sleep obtained, the time of rupture of the membranes, the state of the fœtal heart and any other information of moment.

If the patient falls in labour by day, she should occupy herself in reading, writing, sewing or minor household duties, anything to take her mind off herself and her sufferings.

It is a safe rule that the medical attendant should be present throughout the second stage, although if he can arrive in a few minutes after being summoned pressure signs may be awaited. In a multipara the nurse must use her own discretion and be guided by the character of the pains and the history of the previous labours. Thus, many women have so short a second stage that it

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is not safe to wait for the rupture of the membranes and the occurrence of bearing-down pains. On the other hand, the voluntary bearing-down efforts with rolling out of the vaginal walls, so constantly seen in perverse multiparæ, simulate second stage pains.

If these rules are followed, the doctor on arrival will only make one vaginal examination, and very often none at all, thereby conferring decided benefit on the patient.

MANAGEMENT OF THE SECOND STAGE.

The second stage is recognised by the change in the character of the pains. First stage pains are of a sharp cutting nature, felt with greatest severity in the back and radiating to the lower abdomen: the patient may attempt to alleviate the pain by crying out or by moving from place to place. When the os is fully dilated a change ensues; the patient has an irresistible desire to bear down, she holds her breath, fixes her legs and contracts her abdominal muscles firmly until the pain passes off. At the same time her face becomes flushed from holding her breath and straining. These bearing-down pains are the best index of the change from the first to the second stage. One warning is necessary, viz., some patients make voluntary efforts to bear down during the first stage, particularly if the membranes are ruptured. A little care in observation will show the difference.

When the second stage begins, the membranes have lost the support of the cervix, and it is at this time they usually rupture, although they may do so any time during the first stage, or it may be necessary to rupture them artificially before the head is born. Occasionally the membranes rupture before labour begins.

When the end of the first stage is approaching, the interval between the pains is apt to be markedly decreased, and the patient may also be nauseated and vomit.

By these clinical signs it is usually easy to tell when the patient enters the second stage without making a vaginal examination. By vaginal examination the patient is known to be in the second stage when the rim of the os can no longer be felt in advance of the head. Once the os is fully dilated retraction draws up the cervix and incorporates it in the lower uterine segment.

When the second stage begins, it is advisable that the patient should go to bed, to enable her to make the best use of her pains. After the membranes have ruptured she must be kept in bed to avoid the loss of too much liquor amnii.

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The left lateral position is the most convenient. It is desirable that the buttocks should be well out to the edge of the bed. Patients sometimes object to this, saying they will fall out, but there is no danger if the back is well arched so that it approaches a position parallel to the head of the bed and if at the same time the thighs are drawn up. In this position the clothes are pulled over her and only raised by the attendant during each pain. If the second stage is at all prolonged, it is probable that the patient will object to maintaining this position. Indeed, the dorsal position, with the legs drawn up, is sometimes helpful to the pains. The lateral position should be resumed when the head presses down on the perineum.

Patients in the second stage can greatly aid delivery by bearing down in a proper manner. This they should do during a pain and only then, by holding their breath, pulling on a towel fastened to the end of the bed, and opposing this pull by fixing the feet against some immovable object, such as a stool, placed against the foot of the bed. The ordinary kitchen roller towel loosely twisted and fastened to the end of the bed serves the purpose readily.

Primiparæ seldom bear down effectually, for the surprise of the labour-pain causes them to cry out, thus releasing the diaphragm and rendering ineffectual the contraction of the abdominal muscles. Chloroform also interferes with this action, and for this more than any other reason delays labour. Most women are amenable to instruction, and greatly improve their efforts when the desired action is clearly explained to them.

Pressure on the fundus during second stage pains, and after the membranes have ruptured, is often a great help to the advance of the head. It can be applied by one or two hands spread flatly over the fundus. As it is very tiring to the operator, it should be reserved for the height of the pain and for those contractions of greatest intensity. It may here be remarked that labour-pains vary in strength, a strong pain always being followed by one or two weaker ones. Some women resent pressure on the fundus, and if a strong disinclination to permit it is shown, a tight binder may be substituted. This period of delay is often wearisome, and the recognition of descent of the head will prove helpful in determining progress.

If the nurse has neglected to see to the emptying of the lower bowel, the extrusion of faecal matter, disagreeable and not free from danger to the patient, is often the first sign that the time of delivery is approaching.

If this untoward accident should occur, it is most necessary to

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wash the perineum and anus at once. Nothing is better for this purpose than pledgets of cotton-wool soaked in a weak lysol or creolin solution, a basin of which should always be close at hand. An enema earlier in labour is a cleaner and safer way of emptying the bowel. This should be given towards the end of the first stage, if the purgative given at the onset of labour has not acted freely. The bladder also needs attention, as a full bladder interferes with uterine contractions, increases the likelihood of perineal tear, adds greatly to the patient's suffering, and is one of the commonest causes of retention of urine, cystitis and vesico-vaginal fistula in the puerperium.

Soon after pressure signs are manifested the head gradually separates the labia, and appears during a pain, to recede when the contraction passes off. This recession is due to the action of the levator muscles, which run from the coccyx and sacrum behind to the pubes in front. They interlace in a median raphé, separating to surround and support the vagina and rectum.

With successive pains the head is driven further down, until it no longer recedes between the pains, but remains visible. The levators now surround the head like a sling, and are in a state of extreme tension as the head advances. It must not be assumed that there is an active antagonism between the expulsive efforts of the muscles causing advance of the head and the muscles of the pelvic floor. During the contraction of one set the others are inhibited and *vice versa*. Thus the sphincter becomes relaxed and the anus gapes, even though they are subjected to no direct pressure. The muscles of the pelvic floor serve the purpose of pushing the head forward and toward the pubes, causing extension, the ultimate movement in the mechanism of its birth.

When to Rupture the Membranes.—It is customary to say that the membranes rupture at the beginning of the second stage, but this is by no means universal. The membranes are frequently seen bulging through the vulva, as the head approaches the perineum. This condition is favourable, and is to be encouraged so long as labour progresses smoothly. When the membranes appear in this manner they should be ruptured. It is also advisable to rupture the membranes during any period of the second stage if progress is interrupted or if the pains are weak. Many errors have arisen from ignorant efforts to rupture the membranes. The fact that they protrude through the vulva does not necessarily mean that the head is close to the perineum, for they may appear thus in cases of contracted pelvis though the presenting part has not fixed in the brim. At times the presenting part is forced deeply

into the pelvis before the os is fully opened and the anterior cervical lip is stretched over the head with the os pointing backwards. This thinned-out cervix has frequently been mistaken for membranes and has been punctured. The fontanelle of hydrocephalus has been punctured by mistake, and the eyes have been injured in face presentations. In the past, obstetricians were in the habit of puncturing the membranes with the finger nail, and the nail was kept especially long for this purpose. Such a procedure is inadmissible to-day, and the wearing of rubber gloves makes it at times impossible to rupture tough membranes with the fingers. Sharp-pointed scissors, a stylet or a hairpin may be used with safety. A hairpin straightened out, placed in the fire until red hot, may be removed by the tongs and cooled by immersion in the antiseptic solution. We have seen a case of delayed second stage, lasting over ten hours, due to intact membranes. The labour was terminated fifteen minutes after their rupture.

It must not be forgotten that when the presenting part is fixed in the lower uterine segment, the uterus is not drained of liquor amnii by the rupture of the forewaters. The recognition of this fact is of the greatest importance. The condition known as dry labour arises from draining away of the liquor amnii, and can only occur when the presenting part is not fixed in the lower uterine segment. It is followed by the shutting down of the uterus on the foetus, so that its walls are applied closely to the latter, causing irregular contractions, metritis from irregularly distributed pressure, and foetal death from interference with the placental circulation.

Rupture of the membranes will be followed by descent of the head to the perineum, and the preservation of the latter now becomes our greatest care.

Support of the Perineum.—During these last labour-pains the perineum is pulled over the head and stretched to extreme tenuity. The impulse to attempt to save it from tearing is almost irresistible, and this impulse has led to the adoption of many different methods for supporting or "saving" the perineum. It is doubtful if any of them are of great value. It must be remembered that the thinned-out perineum contains no important structures. Indeed, it is nothing but skin and subcutaneous tissue, and it is of little moment whether it tears or not. What really matters is whether the levator muscles are able to withstand the strain. They frequently give way before the head reaches the perineum at all, and this tearing is manifested by the appearance of slight ante-partum hæmorrhage, the occurrence of which at this stage is an indication that the levator has been torn.

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It is customary to think of a ruptured perineum as a split of the median raphé. Such splitting occasionally occurs, unaccompanied by tearing of the fibres of the levator ani. Much more commonly, however, the tear assumes a Y shape, the divergent limbs of the Y passing on each side of the vagina, forming deep sulci where the fibres of the muscle have been torn across. The muscles may be torn, the skin of the perineum remaining intact. This should be remembered in inspecting the perineum after delivery.

When the head shows at the vulva is the time for the final cleansing of the hands. Rubber gloves should be worn, preferably on both hands, but if the expense is to be considered, the left hand only need be gloved. Some practitioners will object to the added expense caused by using gloves. They only cost 2s. 6d. or 3s. a pair, and when properly cared for last a long time. Their value is too great to allow petty economy to be an argument against their use.

Before the head is delivered the vulva should be cleansed as for a vaginal examination.

It is evident that any manœuvre which will take tension off that portion of the levators running from the pubes to the back wall of the vagina will be advantageous. This cannot be done successfully by pressure with the flattened hand. That this direct pressure determines a perineal tear may be easily demonstrated, and the tear forms in the direction of greatest pressure. An attempt has been made to surmount this difficulty by placing a finger in the rectum to press the presenting part toward the pubes. Such a suggestion only emphasises the difficulties experienced and the unsatisfactory results of the various methods employed.

The Rotunda Hospital method is as follows: The patient lies in the left lateral position with the hips well out to the edge of the bed and the thighs flexed. The obstetrician passes his left hand (gloved) over the patient's abdomen, between the separated thighs, and places two or three fingers on the head appearing at the vulva. Every effort is made to keep the head pressed away from the perineum towards the pubes and at the same time to keep it flexed by pressure near the fourchette until the occiput passes beneath the symphysis. This maintenance of flexion enables the head to escape by the smallest possible diameter, the sub-occipito-bregmatic (3½ inches), a most desirable result. Failing to remember this point the attendant may be tempted to express the head prematurely; in so doing he causes too early extension and escape of the head by a larger diameter. If advance is slow at this stage, it may be aided by pressure on the uterus with the left elbow and forearm.

When the head is passing through the vulva, bringing the knees together takes tension off the perineum. When the occiput has come from under the symphysis and what would be the next to the last pain is passing off, the head may be quietly slipped out by extension, produced by pressure with the right hand between the coccyx and anus. This is the only justifiable use of the right hand in supporting the perineum. When the head is born at the end instead of during the height of a pain, rupture of the perineum is less likely to result.

Episiotomy.—Deliberate cutting of the tense perineum is seldom either necessary or justifiable. In those rare cases in which the head appears through a tear of the perineal body just in front of the anus (central tear), prompt performance of episiotomy will prevent backward extension of the tear into the rectum. Rigidity of the soft parts causing delay to delivery is a condition which occasionally calls for episiotomy. When subsequently stitched, the healing after episiotomy is no better than that after a spontaneous tear, and as the inevitability of a tear is never certain, episiotomy should be performed only for the rare indications mentioned.

After the head is born, the recommendation usually given is to pass a finger into the vagina, to feel if the cord is around the child's neck. This is to be avoided as unnecessary and adding to the risk of infection. Pulling the head back towards the perineum or forward towards the pubes will stretch the neck and bring the cord into view, if it is round the neck. If there, it should be pulled over the head, or loosened to allow the shoulders to slip through the loop. Failing either of these the cord should be quickly tied in two places, divided between, and the child immediately delivered. A cord actually short, or one relatively shortened by twisting around the neck or body, is not an uncommon cause of delay in delivery and of asphyxia neonatorum. Several loops may be around the neck.

When the head is born, and while waiting for the next pain to deliver the shoulders, the mouth, eyes and nose are to be freed from mucus and vaginal discharges. The novice is frequently alarmed by the length of time which elapses between the birth of the head and that of the shoulders. The child is being supplied

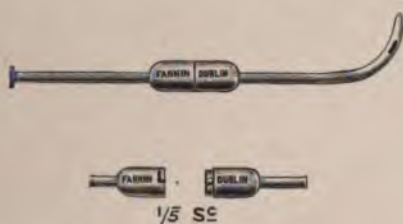


FIG. 6.—Carton's catheter.

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with oxygen from the placenta and attempts at inspiration should be discouraged until the mucus is removed. The first breath is inspiratory and may result in the inspiration of mucus into the trachea and lungs. Attempts at inspiration are prevented by upward pressure behind the chin, obliterating the mouth cavity, while the little finger wrapped round with a strip of moist cotton-wool is gently swept around the mouth and over the back of the tongue, to remove the mucus. Then the nose is squeezed from above downwards and the nostrils cleaned with another piece of moist cotton-wool. Finally, the secretions are removed from the eyelids with pledgets of moist cotton-wool, wiping towards the nose.

It is well to wait for a pain before delivering the shoulders. Uterine contraction may be encouraged by gently rubbing the fundus with the left hand while holding the head with the right. The necessity for previously having learned the position of the child is now apparent. If the back is to the left the face will turn towards the patient's right thigh, that is, up towards the ceiling; if to the right, the face turns the opposite way, down towards the left thigh. Serious injury to the child has been caused by attempting to turn the head in the opposite direction to that which it would naturally take, or in other words, twisting it against the rotation of the shoulders. One point only is to be observed in the delivery of the shoulders. They should be delivered one at a time, and not by the bis-acromial diameter, the obvious reason being the lessened likelihood of a perineal tear. When descent and rotation of the shoulders have occurred, the head is grasped under the chin, and behind the occiput, and the shoulders delivered by a rocking movement, first one and then the other. As a rule, the anterior shoulder sticks under the symphysis, and the posterior shoulder should be delivered by strongly flexing the chin towards the mother's abdomen, then by reversing the movement the anterior shoulder is disengaged and it slips from under the pubes. These movements may be reversed. The delivery of the rest of the child presents no difficulty. It is well to have the nurse follow down the fundus of the uterus with her hand as the child is born.

If the lateral position is maintained for a few moments, the escaping blood and liquor amnii will flow into the bath at the side of the bed, a precaution which minimises the amount of soiling. At the same time the perineum may be wiped and carefully examined, the labia being separated by raising the buttocks to permit thorough inspection. In some instances it is impossible to say before this time that the perineum has escaped injury. At this

stage the patient is often lightly anæsthetised, and there is a favourable opportunity for repair of any lacerations.

MANAGEMENT OF THE THIRD STAGE.

The third stage begins when the baby is born and ends with the expulsion of the after-birth. After the details mentioned above are attended to, the patient is gently rolled over on to her back, with her knees drawn up and separated, the child lying on the bed between her legs. She is covered with the bedclothes, beneath which the uterus is controlled until the placenta is expressed. Shivering at this stage is common and has no significance.

Ligature of the Cord.—So long as the cord continues to pulsate the child is getting oxygenated blood and there is no cause for anxiety even though its respirations are feeble. One warning is necessary; the pulsations stop much sooner at the placental than the umbilical end, and the cord may be tied as soon as it has stopped pulsating at any position. It has been computed that the infant gets 3 extra ounces of blood by waiting for pulsations to cease, a valuable asset to the newborn child, as the digestive functions do not start until the third day.

Hempen thread is the best material for tying the cord. It is sterilised by boiling and is put in biniodide or corrosive sublimate solution before being used. A wet thread makes a firmer knot than a dry one; the antiseptic impregnating it is one of the factors guarding against septic infection of the cord, a condition fortunately rare, but by no means unknown, and quite unpardonable when it does occur.

The ligature is applied 2 to 3 inches from the umbilicus. A surgical knot is used, great care being taken to tie it very firmly. Approximating the thumbs gives a good purchase for a firm knot and lessens the chance of slipping. A second ligature is only necessary in case of twins, but it prevents escape of blood from the placenta, which would add to the soiling of the sheet. If placed near the vulva, it acts as a guide to apparent lengthening of the cord.

Tying and severing the cord is one of those trivial operations which are of great importance. I have seen children die from hæmorrhage of the cord, due to a loose ligature. I have also seen a great toe snipped off owing to carelessness. Injuries to the fingers, toes and penis are reported, and probably occur oftener than one would think. It is only those with a large obstetrical experience who know how easily such accidents may happen. To avoid them

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the left hand is held palm upward with the cord placed across it. The scissors are used with the point towards the palm, the middle and ring finger being separated just enough to give room for the scissors between them. The scissors are thus surrounded and prevented from doing any injury. Specially shaped scissors for cutting the cord are not necessary. Needless to say the cord is cut to the maternal side of the first ligature. The child is wrapped up and put temporarily in some safe place until the delivery is finished. The cord should be inspected occasionally to see there is any hæmorrhage.

It is not necessary to wrap up the child too warmly, as cold causes it to cry, thereby inflating the lungs and starting the respiration in a normal manner. It also regulates the heat centre and accustoms the child to bear with impunity a lower range of temperature than usual, which tends to its subsequent strengthening.

Control of the Uterus.—The dorsal position during the third stage is the most convenient. The abdominal muscles are relaxed and offer no resistance to the attendant's hands as he sinks them into the abdomen just above the uterus. The fundus is permitted to lie evenly in the hollow of the palm.

It should be remembered that the uterus is not always in a state of contraction, but is subject to the ordinary rhythm of contraction and relaxation that goes on throughout labour. During the period of relaxation some blood from the maternal sinuses escapes between the partially separated placenta and the uterine wall. This retro-placental hæmotoma will tend to separate the placenta still more each time the uterus contracts. This seems to be the ideal method for separation of the afterbirth. Some eminent authorities hold that this retro-placental hæmorrhage should be encouraged, and therefore the uterus should not be controlled but left to its own efforts to deal with the afterbirth. This is a mistake, because the blood poured out behind the placenta is likely to be more than required, and in the second place concealed post-partum hæmorrhage might easily escape observation, were the attendant's hand not controlling the fundus.

On the other hand, mischief frequently results from the mistaken belief that when the uterus becomes relaxed it must be immediately rubbed up to a contraction. Moreover, this rubbing up is not always rightly carried out, for the finger tips are dived into the uterus to stimulate it to contract. Such manipulation causes uterine contraction, but it is very apt to be irregular, and to bring about retention of the afterbirth.

As long as the uterus is not growing abnormally large, and hæmorrhage does not appear at the vulva, it is of little moment whether the uterus contracts or not. I particularly wish to oppose the manipulation usually described as Credé's method, namely, waiting ten to fifteen minutes, then rubbing the uterus to a contraction and squeezing the afterbirth from it as if squeezing a lemon. Continuous obstetrical success cannot follow such a procedure. Some placentas are much more firmly attached than others, and though in one case the placenta separates in a quarter of an hour, in another it may not separate for forty-five minutes or longer, and still not require manual removal.

It should be a rule not to attempt to express the afterbirth, until the uterus has succeeded in expelling it into the vagina. If this does not occur within an hour, then Credé's method may be attempted. It often fails, and when it does the failure is probably due to irregular or hour-glass contraction of the uterus. This passes off if the controlling hand is removed and the uterus not interfered with, provided the attendant has patience to wait another hour. A hypodermic injection of $\frac{1}{4}$ gr. of morphia tends to relax the spasm of the circular fibres which causes the retention of the afterbirth.

This recommendation of delay may be considered impracticable, calling for more patience on the obstetrician's part than he can possibly afford; but the proper conduction of the third stage of labour is the most important part of the attendant's task, and is almost the only part, except the tying of the cord and the repair of the perineum, that necessitates his presence at a normal case. Puerperal sepsis, both mild and severe forms, would be very much less frequent but for the complications that occur during the delivery of the afterbirth. It is a common experience that cases of the severest sepsis are frequently associated with retention of portions of membranes or placenta.

On the other hand, it is not necessary to wait half an hour or even a quarter of an hour if the uterus has expelled the afterbirth into the vagina. Therefore the indications of this expulsion should be carefully observed.

Signs Indicating the Expulsion of the Placenta from the Uterus.—(1) *Apparent Lengthening of the Cord.*—In tying the cord the second ligature or a clip forceps is applied to it a short distance from the vulva, care being taken gently to pull out any loops that are in the vagina. As the placenta is expelled from the uterus the cord comes out through the vulva. This sign, lengthening of the extra-vulvar cord, may not occur under two

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conditions: First, if the placenta is already in the vagina when the cord is tied; secondly, if the cord loops in the vagina instead of coming straight down. Gently stretching the cord will pull out the loop, and then the lengthening will be demonstrated.

(2) *Rising of the Fundus.*—When the placenta has left the uterus and is lying in the upper vagina, it displaces the uterus out of the pelvis and the fundus is felt to rise to a higher level in the abdomen. Care should be taken in controlling the uterus not to let the rising fundus slip by the hand. If it does, the hand presses on the lower uterine segment, and may set up hour-glass contraction. When the uterus is filling with blood the fundus rises, but

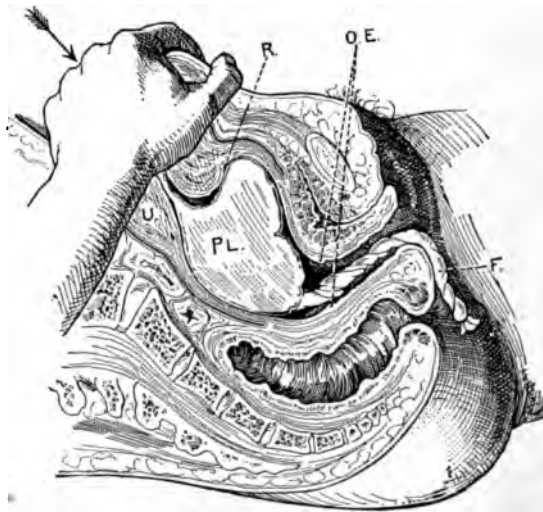


FIG. 7.--Expression of the placenta. (From Jellett's Midwifery.)

this condition is readily recognised by the boggy feel and indistinct outline of the uterus, and by the patient's condition.

(3) *Increased Mobility and Change in Shape of the Uterus.*—The uterus lying above the placenta in the vagina is found to move much more freely and easily than it did when it still contained the placenta. At the same time it is noticed that the body of the uterus has become smaller and harder than it was before.

(4) *Prominence of the Hypogastrium*—The afterbirth in the vagina sometimes causes a prominence of the hypogastrium closely resembling a full bladder. This sign is often wanting, and cannot be relied upon as an indication that the placenta is no longer in the uterus.

(5) *Failure of the Cord to Pull up with the Uterus.*—When

the placenta has left the uterus, if the contracted organ is grasped on each side near the fundus and pulled up towards the diaphragm, the cord lying outside the vulva is not affected. On the other hand, if the placenta is still in the uterus, or if the membranes are adherent, as the uterus is pulled up the cord lying outside the vulva is drawn into the vagina. This is the most certain of all the signs and the one most to be relied upon.

Expression of the Placenta.—The vagina recovers its tone very slowly. I was recently called in consultation to remove a placenta supposed to be adherent for twenty-four hours. It was really lodged in the vagina, and was easily expressed. To save this delay the afterbirth should be expressed when it reaches the vagina. (Fig. 7). When the signs enumerated are present, a contraction is waited for or the fundus is rubbed up to a contraction, and the afterbirth expressed from the vagina. To do this the palm of the hand is placed on the fundus, the contracted uterus is first pushed back towards the spine and then down to the pelvic brim, enough force being used to push the placenta gradually through the vulva. The ligaments and pelvic fascia are so relaxed after delivery that the cervix may be pushed down to the vulva. This being so, the afterbirth must move in front of it.

Sometimes the retention of the placenta in the uterus is accompanied by constitutional symptoms of shock, particularly when the delay in expulsion is due to hour-glass contraction. These symptoms are out of all proportion to the amount of blood escaping either



FIG. 8.—Separation of the placenta by Schultze's Mechanism. (From Galabin and Blacker's Midwifery.)

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into or from the uterus, and seem to be due to interference with the nervous mechanism of uterine contraction. The suggestion has been made that this condition is due to air embolism from the suction of air into the uterine cavity. In such cases the placenta should be expressed directly from the uterus without waiting for its spontaneous expulsion. When the loss of blood during the third stage is excessive, causing constitutional symptoms (post-partum hæmorrhage), the afterbirth should be expressed immediately. If it does not come away readily, in spite of Credé's expression, gentle traction on the cord combined with compression of the uterus may bring away a placenta which might otherwise have to be removed manually. Unless constitutional symptoms arise, it is best to wait for the uterus to expel the placenta, rather than run the risk of shock and sepsis attendant on manual removal. Patients who showed no constitutional symptoms have been kept three hours in the Rotunda labour ward before it was possible to express the placenta. But such delay is justifiable if it obviates the necessity for manual removal. In our last 2,000 cases there has been retention of the placenta for more than an hour ninety three times, and only four times was manual removal necessary twice of the entire placenta and twice of retained cotyledons. This represents hospital practice, and the percentage of manual removal in private practice should be very much less.

If the mechanism of separation and expulsion of the placenta has followed the lines indicated, the foetal surface of the placenta at or near the insertion of the cord, if it is central, appears first at the vulva. The placenta comes away turned back on its maternal surface with the membranes trailing behind. In other words, the placenta comes with the foetal surface first through the rupture in the membranes, which are turned inside out as they come away, and the amnion is outside the chorion. On the maternal surface of the placenta will be found a greater or less amount of blood clot representing the retro-placental hæmotoma which caused its separation. As a rule, the membranes follow the placenta in their entirety, unless too great haste is exercised in their removal.

When the retro-placental hæmotoma escapes before the afterbirth is entirely separated, the placenta appears at the vulva either edgewise, rolled on its long axis, or maternal surface first.

Expression directly from the uterus nearly always delivers the placenta maternal surface first. Separation in these cases is due to contraction of the placental site.

Retention of membranes is much more frequently seen when the placenta comes edgewise or with the maternal surface first

than when the normal mechanism obtains. Therefore separation of the placenta by contraction of its area of attachment cannot be considered a normal mechanism.

If the membranes should be adherent, and care is not exercised in delivering them, a portion may be left behind in the uterus or vagina. The old-fashioned plan of twisting the placenta round and round to roll the membranes into a rope was adopted with the object of twisting them from the uterine wall. It does not succeed in this and is a common source of retention. A better plan is to give the placenta two or three twists, grasp the membranes outside the vulva in the palm of the hand and all the fingers.

This ensures even pressure over a large area.

A gentle and continuous pull can now be maintained and will in the vast majority of instances succeed in removing the membranes entire, after an interval which may vary from a few seconds to several minutes. During the traction the membranes may be felt to tear. This is comparable to tearing calico and is readily recognised. When a tear begins it will continue as long as the traction continues, and it is useless therefore to pull further until a grip is obtained above the tear and tension is taken off the tearing point. If the membranes tear and the end is left at or near the vagina, they should be removed, as otherwise they will almost certainly decompose and cause foetid lochia and sapraemia. The end should be grasped between the thumb and base of the index finger, and the index finger pushed into the vagina and twisted around until the membrane pulls off or tears inside the uterus. Rubber gloves make grasping the membranes difficult.

A useful substitute is a broad-bladed tongue forceps, which gives a firmer grip. If a small piece of membrane is left behind in the uterus, it is best not to interfere, as it usually disintegrates and comes away in the lochia without causing symptoms. If, however, half or more of the chorion is left behind, it is most likely to cause trouble subsequently, and it is probably better to remove it at once.

Examination of the Afterbirth.—After the expression of the afterbirth it should be a routine practice to examine it to see if there is anything missing. To do this it is placed in a flat bowl with the maternal surface down and the membranes raised all around it, the cord being placed inside the membranes. In this



FIG. 9.—Separation of the placenta by Matthews Duncan's Mechanism. (From Galabin and Blacker's Midwifery.)

way the size and position of the rupture in the membranes is determined. The membranes are separable, and the amnion can be peeled back over the foetal surface of the placenta to the root of the cord. The chorion, on the other hand, is attached to the edge of the placenta. This examination of the membranes shows if they are complete or incomplete. The chorion is usually the one to be incomplete. After inspection of the membranes the placenta is laid foetal surface down on the palms of both hands and the maternal surface carefully scrutinised to see that the cotyledons are complete and that they all fit together without any defect. Sometimes the placenta shows areas of separation between the cotyledons that look as if a piece were missing, but by approximating their edges the normal appearance is regained. The absence of a piece can hardly be overlooked, and it should be removed from the uterus without delay.

Succenturiate Placenta.—Occasionally inspection of the membranes shows a circular hole or defect to the edge of which vessels run. This marks the position of a small accessory placenta which has been left behind in the uterus. An accessory placenta usually comes away with the rest of the afterbirth, but exceptionally it is retained. A piece of placenta or a succenturiate placenta, if left behind, is certain to cause severe sepsis. It is universally agreed that immediate removal is necessary, even if post-partum hæmorrhage has not occurred.

For some time after the completion of the third stage the obstetrician's hand remains pressed on the uterus to control it. If this is done improperly, the uterus may be driven back into Douglas's pouch. To avoid such complications the uterus is ante-flexed over the pubes by forcing the hand, ulnar surface down, behind the back wall of the uterus and pressing it forward. When the contractions are firm and the uterine cavity is emptied of all clots, the final washing up is started, preparatory to applying the pad and binder.

Many patients are infected during the puerperium whilst the vulva is being cleansed, and unless the nurse can be fully depended upon, the first washing up after delivery should be done by the doctor. The vulva is wiped from before backwards with pledgets of sterile cotton-wool soaked in weak creolin or lysol solution. Each pledget is thrown away after one wipe to avoid carrying bacteria forward from the anus. In cleansing the vulva before making a vaginal examination the labia are separated and their inner surfaces wiped. At the stage now under discussion this is both unnecessary and undesirable, as it is liable to force

micro-organisms into the vagina. The nurse is therefore instructed never to wipe between the labia at any time during the puerperium. After cleansing the vulva the blood is washed from the thighs and buttocks. This is facilitated by wiping with dry, immediately after using wet, cotton-wool. To cleanse the buttocks the patient is asked to raise herself on her shoulders and feet, a clean piece of the drawsheet is pulled under her, then her back and buttocks are rapidly washed and dried. Finally the drawsheet is entirely withdrawn and the patient resumes the recumbent position, lying on the binder and clean sheet.

The Vulval Pad.—A pad of Gamgee tissue is placed between the legs over the vulva before the binder is fastened. The pad is best used dry and may be sterilised either by steam, which is preferable, or by scorching it brown before the fire, if a steam steriliser is not available. Pads thus prepared are infinitely preferable to linen diapers steeped in an antiseptic solution and applied wet.

The Binder.—Many obstetricians are sceptical as to the usefulness of the binder and believe that it has no other effect than a tendency to cause retroflexion. I cannot endorse this opinion. When properly fitted the binder maintains the uterus in ante flexion and prevents dilatation of its cavity with clots. It counteracts any tendency to tympanites, thus helping the tissues to return to their normal unstretched condition. Women in better circumstances often prefer binders fitted with straps and buckles, supplied by surgical instrument makers. A piece of unbleached calico, 18 inches wide and 36 inches long, answers every purpose. Its proper application is a matter of considerable importance. Lusk gives the following directions: "In adjusting the binder the physician should place himself to the right of the woman; he should seize the near end between the thumb and two fingers of the left hand, while with the right hand he draws the further portion smoothly over it. The two ends should then be held with the left hand, and the pins, which should preferably be of a large size, should be inserted with the right. The process should begin below, and be followed upward at intervals of about 2 inches." These details are given because the writer remembers his own embarrassment arising from his inability to get information upon this trivial subject in the early days of his practice. Moreover, as women are sometimes tenacious of having the binder first applied by the physician, to know how to do it with address is not an indifferent accomplishment. Many place a compress made of a folded towel above the symphysis pubis. This addition usually serves no better purpose than to displace the uterus to one side.

Fifteen or twenty minutes after its adjustment the binder should be unpinned and the uterus rubbed up to express any clots that may have formed. This must not be neglected under any circumstances, as considerable hæmorrhage may occur in a relaxed uterus without showing much external evidences. Spontaneous expulsion of clots is at times associated with marked symptoms of shock out of all proportion to the amount of blood lost.

The administration of 1 or 2 drachms of ergot after the completion of labour is not necessary in a normal case, but will do no harm. A reliable preparation should be used, and it is contra-indicated until after the placenta has come away.

It is customary for the obstetrician to remain in the house for an hour after the completion of labour to see that no abnormalities

occur, the principal one of which is, of course, post-partum hæmorrhage. If at the end of this time the uterus is firm, no undue amount of blood is coming, and the patient's pulse is all right, he may safely leave. Women to whom chloroform has been administered may exhibit a rapid pulse for some time afterwards. If not associated with other symptoms of shock and not



FIG. 10.—Perineal needles, $\frac{1}{2}$ -size.

accompanied by hæmorrhage, it is of no moment. With this exception the pulse should be slow, full and regular, usually averaging ten to fifteen beats less than during labour. Normal labour in a healthy woman has, of course, no effect on the temperature.

The Perineum.—The time to examine the perineum is after the birth of the child, before the mother is turned on her back. The labia are sponged and separated, rendering the position and extent of the laceration readily visible. If the patient has had chloroform, this is the most convenient time to repair any lacerations, an extra amount of chloroform being given if necessary, and care taken not to include the membranes or cord in the sutures. They may be left untied until after the removal of the afterbirth, but this is seldom advisable.

Any tear extending beyond the fourchette, which means anything over $\frac{1}{2}$ inch in extent, should be repaired immediately. An aseptic repair prevents infection and the formation of a puerperal ulcer; it ensures good union and prevents subsequent gynaecological ailments resulting from loss of support of the pelvic floor, due to

tearing of the fibres of the levator. The value of primary repair cannot be over-estimated, and to secure good results careful attention to every minor detail is imperative.

"A fully curved needle, $2\frac{1}{2}$ inches from eye to point, is threaded with silkworm gut and held in a long needle holder. The patient lies on her left side, her hips well out to the edge of the couch, the right leg flexed with the right foot on the left knee and the right thigh abducted. The operator's left hand is passed over the woman's abdomen and between her legs. The thumb and middle finger are used to separate the edges of the tear, enabling the operator to see clearly the extent of the laceration; but we do not rely on sight alone, for the index finger is used to determine

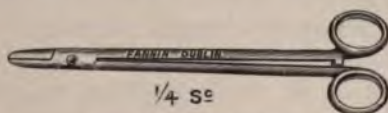


FIG. 11.—Needle holder.

the extent of the injury to one or both levator muscles, and is then inserted to the apex of the tear beneath the vaginal mucous membrane. The stitch nearest the anus is inserted first. Inserted on the skin surface it is passed along the under side of the tear (taking a deep bite of the tissues), then deep to the vaginal mucous membrane, and beneath the index finger in the apex of the tear; then along the upper side of the tear, again taking a deep bite of the tissues, to the skin surface opposite the starting point; the stitch is buried from start to finish. The subsequent stitches are similarly placed, but may emerge on to the vaginal mucous membrane. When the torn muscles are brought together and united in the median raphé, they functionate as perfectly as if they had never been torn." ²

For the description of the repair of a complete tear *see* p. 211.

A patient with a laceration requires no different dressing or treatment during the puerperium than one with an intact perineum.

E. HASTINGS TWEEDY.

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THE MANAGEMENT OF LABOUR IN SPECIAL PRESENTATIONS.

BREECH PRESENTATION.

WHEN the breech presents, it is usually due to some foetal or maternal abnormality. In many instances it is a provision of nature to enable spontaneous delivery to occur. For this reason many obstetricians hold that it is inadvisable to convert the presentation to a vertex, even when this is possible. I am not in agreement with this view. I ask my patients to return for examination five to six weeks before full term. This examination consists in taking the external pelvic measurements, noting the presentation and position of the child, correcting any mal-presentation to vertex, and determining the relative size of the head and pelvic inlet by pushing the head down into the brim (Müller's method). The urine is also examined. After labour has begun external version is nearly always impossible, and no other method of changing a breech presentation to a vertex is to be recommended.

The diagnosis of breech presentation by external palpation is usually easy. The head is felt in the fundus, and, when there, is seldom mistaken. The sulcus of the neck is most distinctive, and the greater freedom of movement of the head in comparison with the breech is a useful diagnostic point. The head also moves independently of the rest of the child's body. When the breech is in the fundus the groove of the groin may simulate the neck sulcus; but free, independent movement is wanting, and later, by Pawlik's grip, the distinct characteristics of a head in the brim become apparent. Foetal movements are usually best felt in the neighbourhood of the breech, and when limbs are palpable they are often in the same horizontal plane.

In breech presentation the foetal heart is heard over the back of the child at a higher level in the abdomen than when the vertex presents. It is most distinct slightly below the level of the umbilicus and not above, as is stated by some authorities.

Vaginal examination is likely to be very deceptive in the early stages of labour. One often cannot feel the presenting part, the finger-tip passing through a partially dilated os, from which protrude

the unruptured sac of membranes unoccupied by foetal parts. Such a condition is not diagnostic of a breech presentation, but is diagnostic of some abnormality. As the foetus descends the presenting part comes within reach of the examining finger. Even at this stage vaginal examination is often confusing, as the breech may feel round and quite as hard as a head. One should never say that a head is felt unless sutures and fontanelles are clearly made out. Similarly, the tubercles on the posterior surface of the coccyx and sacrum are so characteristic of the breech that they always should be felt for and the diagnosis made on them alone. When the membranes have ruptured, meconium unmixed with liquor amnii comes away freely and the finger may be passed through the anus, which is differentiated from the mouth by the absence of the tongue and gums and the smooth grip of the surrounding sphincter ani. If the caput is not too well marked, the other bony landmarks of the foetal pelvis may be recognised.

One or both feet may present and come down, or the legs may be fully extended along the body. Delivery is not materially affected by any one of these conditions.

The haunting fear of the young obstetrician is that he may encounter an impacted breech. On this account it is often advised that a foot be brought through the os when the membranes have ruptured and conditions are favourable, the suggestion being that the leg will aid the obstetrician in pulling the body through. If the foot can be felt easily at the os and the manipulation is without difficulty, it may be advisable to bring the leg down. If this is troublesome I do not advise it. Indeed, there is a theoretical objection, for the larger the presenting part the more completely will the soft parts be dilated and the more rapidly will the after-coming head pass through. For practical purposes this objection is negligible.

The Management of the First Stage of Labour in a Breech Presentation differs from that in normal labour in the fact that the



FIG. 1.—Breech presentation. First position.

patient should be kept in bed to avoid premature rupture of the membranes. This is prone to occur, because the breech does not fill the lower uterine segment as well as the head; there is free communication between the fore-waters and after-waters, causing presenting, unsupported membranes to feel the full force of uterine contractions.

The dilatation of the os is somewhat slower, and this is a more insistent reason for preserving the membranes intact.

For a considerable time the further progress of delivery differs in no way from that of a normal vertex presentation.

The Second Stage is managed in the same manner as in normal

labour, and if there is delay in the advance of the breech, fundal pressure should be applied. When the membranes have ruptured meconium unmixed with liquor amnii comes away during the passage; this has no unfavourable significance. The perineum dilates slowly as a rule, and the breech appears at the vulva with the bis-acromial diameter in the antero-posterior diameter of the outlet.

When the sulcus of the greater sciatic foramen comes prominently into view the delivery of the buttocks may be facilitated by hooking a finger into the groin and pulling when the uterus contracts. The legs should be brought out one at a time gently, to avoid extensive lacerations of the vagina and perineum.



FIG. 2.—Attitude in breech presentation when the legs are fully extended.

The child is now born as the umbilicus and the cord is pulled down to take off the stricture which impedes the circulation. As long as the cord pulsates normally, further progress is left to the natural forces aided by fundal pressure. When the pulsations become slow and feeble there should be no delay in completing the delivery. Abdominal pressure has the advantage of bringing the arms down with the shoulders and tends to prevent their extension. On the other hand, traction on the body will have an opposite effect. However the delivery

of the shoulders is effected, it should be done rapidly. If traction is required, the thighs, bent at right angles to the body, are grasped with the fingers, the thumbs are extended along the sacral and lumbar regions of the back, and sufficient force is exerted to bring the axilla within easy reach. The feet are then grasped in one hand with the index finger between them, the thumb around one and the remaining fingers around the other. The lower the axilla comes the easier it is to bring down the posterior arm, which is always brought down first. To accomplish this, the child's body, grasped by the feet, is swung well up towards the mother's abdomen and slightly towards the side away from the child's back. The arm is brought down by the hand which can be passed in with its palmar surface next the child's back and the ulnar surface against the perineum. This hand, gloved and well lubricated with soap or lysol solution, is passed along the back and over the shoulder until the first three fingers lie along the humerus from acromion to elbow. The arm can now be swept down across the face and the abdomen without any fear of fracture. The other arm may be brought down as an anterior arm, or the child may be rotated until the anterior becomes posterior. It is then brought down in the same manner as the other.

To bring it down as an anterior arm the child's body is held in such a position that the direction of its long axis corresponds to that of the mother's body. Pulling it strongly back against the perineum jams the anterior shoulder against the pubes. The arm is brought down by passing a hand (whichever is best adapted for the purpose) over the shoulder, with the fingers on the humerus down to the elbow. It is then swept across the face exactly in the same manner as in bringing down the posterior arm. In delivering the arms great care should be exercised to distribute the pressure of the fingers over the whole length of the humerus. Localised pressure such as is exercised by one finger very often determines a fracture. This accident is occasionally followed by serious consequences, the musculo-spiral nerve being involved in the callus and paralysed. A much less serious but more common accident is fracture of the clavicle by inward pressure as the hand is passed over the point of the shoulder.

If there is any difficulty in delivering the anterior arm, it is best to rotate the child until the extended arm becomes posterior. The body is grasped with both hands and pushed upwards to disengage the shoulders. The direction of rotation is indicated by pulling the prolapsed arm across the chest. The way the hand points is the proper direction to rotate. According to the position of the child's

back this may be the long or short way to bring the arm to lie behind in the hollow of the sacrum, but rotation should always be carried out in this direction, as it tends to sweep the arm from behind the head and make its disengagement easier. Very occasionally this form of rotation fails, and when it does, rotation in the opposite direction is successful. When the arm lies behind, it is brought down in exactly the same manner as the first.

Nuchal Position of the Arm.—This may be primary or result from rotation in the wrong direction. The hand lies behind and below the occiput, and may occasion extreme difficulty and considerable delay in delivery.

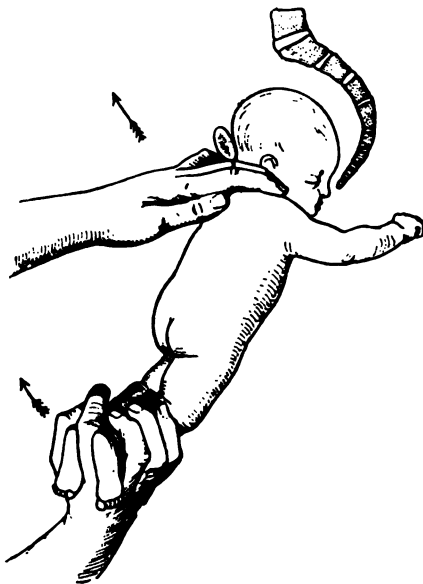


FIG. 3.—Delivery of the after-coming head.
(From Jellett's Midwifery.)

An arm in this position should be disengaged by rotating the child's body in the direction in which the extended hand points, that is, the chest is rotated towards the shoulder of the extended arm.

The difficulty in delivery of the after-coming head varies in each case. The head lies in the vagina, with the contracted uterus above it and exercising no further expulsive power. Occasionally spontaneous delivery results from the contractions of the abdominal parietes pushing the uterus down towards the vulva, the head

moving before it. Delay in delivery is inadvisable, as the child is in imminent danger. The want of oxygen induces attempts at respiration, which result in the inspiration of mucus, liquor amnii, meconium and blood into the bronchi and lungs. Rapidity of delivery is essential. The usual time given in which to ensure a living child is three minutes from the period the cord ceases to pulsate, and it is only those with large experience who realise how short is this time.

There are innumerable methods suggested for delivering the after-coming head. The following may be relied upon, and if they are unsuccessful, probably no other method would give a different result.

The dorsal position is the most convenient when there is any difficulty with the after-coming head. It is usually advisable to have the patient lying on her back across the bed, her hips well out to the edge, and her legs held by assistants or her feet placed on two chairs.

The essential feature in delivering the head is the maintenance of flexion during extraction. The simplest and most easily performed method is carried out by grasping the feet in one hand and pulling them strongly up towards the mother's abdomen; at the same time the first and second fingers of the other hand are placed over the clavicles at either side of the neck, the shoulders are lifted towards



FIG. 4.—Delivery of the after-coming head.

the ceiling, flexing the head by pressing the occiput against the pubes. This manipulation is simple, easy, rapidly performed and often successful. Should it fail it is a mistake to persist, but the next method should be tried.

The child is laid astride the forearm of the operator, one arm and one leg hanging down on either side. The index and middle finger are passed up into the mouth, well back over the base of the tongue. This keeps the head flexed, but should not be used for traction as it might fracture the jaw. For the same reason two fingers are used instead of one; they are placed far back in the mouth. The fingers of the other hand grasp the shoulders, as in

the first method, and exert strong traction, at the same time lifting the shoulders to keep the head flexed. The power of this traction may be greatly increased by passing a piece of iodoform gauze, thick enough to avoid abrasion of the skin, around the neck, above the shoulders and under the arms, as children pass reins in playing horse. While traction is being exerted, an assistant should be directed to press with both hands on the fundus, using a considerable degree of force. If unassisted in the delivery, one of the operator's hands may be used to press on the fundus or directly on the head above the pubes, instead of putting traction on the shoulders.

When the head cannot be pulled through, it is a good plan to wait passively for a few seconds and then try again. This gives the head a chance to mould, and is frequently followed by surprisingly easy delivery. Another effective means of aiding delivery is to press directly on the head just above the pubes, remembering the thinness of the lower uterine segment and the possibility of rupturing from pressure.

The delivery of the after-coming head sometimes necessitates the exhibition of great force, particularly in primiparæ; therefore birth injuries are not uncommon. For this reason the application of forceps to the after-coming head is suggested, and this operation presents no difficulty. An assistant holds the legs well up towards the mother's abdomen, giving free space for applying the forceps. Therefore it is advisable in all breech deliveries to have forceps ready for use, should the occasion arise.

The description given above pre-supposes that the occiput has rotated to the front. This is by no means always true, nor is it always easily accomplished. To bring it about, the head is pushed up into the vagina and rotated by placing the fingers on the chin; if rotation this way fails, the reverse direction should be attempted. An alternative method of delivery is to grasp the child by the legs and pull the body well back against the perineum, disengaging the chin from behind the symphysis. Delivery may now be completed by continuing the direction of the traction, aided by abdominal pressure, or by pulling the child's legs well up over the mother's abdomen. Another method is to make the latter line of traction throughout, bringing the occiput out first, followed by the vertex, forehead and face, the child being turned completely upside down.

In flattened pelvis the head often comes through the brim with its antero-posterior diameter in the transverse diameter of the inlet. This is the normal mechanism in these cases, and should not be

interfered with, unless the occiput tends to go back into the hollow of the sacrum. This should be prevented by aiding its anterior rotation with the hand in the vagina if necessary.

Impacted Breech.—Impaction occurs after the breech has passed through the brim. If the breech does not engage when the membranes rupture, it is due probably to contraction of the pelvis, although a full bladder or rectum may be accountable for it. Slow advance does not necessarily mean impaction; in fact, this diagnosis is justified only when foetal or maternal distress is manifested after a prolonged second stage. A rise of pulse and temperature, a well-formed lower uterine segment and beginning tonic contraction of the uterus are maternal symptoms calling for immediate delivery. A foetal heart-rate above 160 or below 120 between pains indicates distress.

Before actual impaction occurs, the likelihood of it arising will be suspected by the occurrence of delay in the second stage and the formation of a large caput. At this stage pressure on the fundus during the pains or the application of a tight abdominal binder, pinned from above downwards, may cause advance. Care should be taken to empty the bladder and bowel. When impaction arises, this treatment is insufficient, and traction is necessary to aid the forces of expulsion. This may be supplied by a finger in the groin, a fillet, or by bringing down a leg.

The simplest treatment is to hook the index finger over the anterior groin and to pull during the pains. Grasping the wrist with the other hand adds to the power of the traction. If the finger is placed in the posterior groin, it rotates to the front as it descends. It is only justifiable to use one finger, and it soon tires. A fillet passed over the groin gives greater available force.

Passing a Fillet.—A strip of sterilised, wet iodoform gauze (6 inches wide) makes a good fillet. It may be passed with the fingers or with a carrier. If the fingers are used, the gauze is pushed up between the child's legs, over one groin and down the outside of the thigh. The reverse direction may be easier. If the breech is so tightly jammed in the pelvis that it is difficult or impossible to use the fingers, a fillet-carrier can be made from a No. 10 or No. 12 male catheter without the stylet. A piece of doubled silk is pushed through the catheter and a loop is brought out through the eye. The catheter is pushed up between the child's legs, out over one groin, and is then guided downwards by a finger in the vagina. The gauze is threaded through the loop of silk, which is pulled home to the eye of the catheter, and the catheter is withdrawn, leaving the fillet in place. Before exercising any

traction the gauze should be pushed home into the groin, otherwise the thigh may be broken.

If the breech is high in the pelvis, passing a fillet is difficult. In these cases it is always an easy matter to bring down a leg. Many authorities consider this the best treatment in every case, even when the breech is impacted down near the perineum.

Blunt hooks of any description are never to be used, as they are very likely to injure the soft parts and break the thigh.

E. HASTINGS TWEEDY.

BROW PRESENTATION.

BROW PRESENTATION is very unfavourable for the delivery of a living child. With a normal child and a normal pelvis the resistance offered to the fixation of the head is so great that spontaneous delivery seldom occurs. The causes of brow presentations are the same as those of face presentations.

Palpation is more to be relied upon for diagnosis than vaginal examination. The fundal and umbilical grips give little information. It is by Pawlik's grip that the condition is recognised and the diagnosis made. As the brow presents, the chin and occiput are on the same level above the pelvic brim. In taking Pawlik's grip the thumb on one side and the fingers on the other are on the same plane, and the presenting part between them feels too wide to enter the brim; as a result the head is felt well above the inlet, unfixed or just fixing. Seldom is it well down until late in labour, and in the majority of cases, particularly when the brow presentation complicates a flattened pelvis, the head never fixes by its largest diameter (mento-occipital).

The foetal heart is heard best over the back as in vertex presentation.

Vaginal examination may be necessary to establish the diagnosis, if palpation is difficult or impossible owing to tenseness of the abdominal wall. Early in labour the usual indications of disparity between the pelvis and the presenting part are revealed, namely, ballooning of the vaginal vault, protrusion of the membranes through the os, and mobility of the head above the brim, too high for recognition. Later, when the membranes rupture and the head begins to fix, the characteristic features of a brow presentation can be recognised by vaginal examination, the whole or half hand being used, if necessary, to effect this diagnosis. The supra-orbital ridges, the eyes, the nose, the brow, and the anterior fontanelle are the points on which to make a diagnosis. As in face presentation, the formation of a large caput obscures the outlines of the presenting part.

An attempt to convert a brow into a vertex presentation is always desirable. It is performed before the onset of labour, or early in the first stage before the membranes have ruptured. The technique

is the same as for the conversion of a face. If successful, the patient is kept on her back or on the side opposite the obliquity of the uterus, and a tight abdominal binder is applied. Late in labour, when the head is partially fixed in the brim, attempts to correct the presentation by external manipulations are not successful. In these cases version, bi-polar or internal, is always indicated, provided the condition of the uterus permits one or other. The hope of spontaneous delivery is so remote and the foetal mortality is so high that it is much safer to turn and bring down a leg, if the degree of contraction of the pelvis gives a reasonable hope that the after-coming head can be brought through in time to ensure the birth of a living child.

Combined internal and external manipulations to convert the brow into a vertex or face presentation are not successful when once the head has begun to mould, for the presentation of the brow recurs immediately that pressure of the hand is taken off the head. It is therefore useless to waste time and subject the patient to risks of infection. External manipulation alone will succeed in every case in which conversion is possible.

If the diagnosis of brow presentation is made when the head is firmly fixed or has passed through the brim, natural delivery will probably occur if sufficient time is given for the second stage. The mechanism of delivery is by flexion after anterior rotation of the brow and face. So long as no maternal or foetal symptoms of distress are manifested, labour should be left to proceed naturally, and spontaneous delivery may occur even after the second stage has lasted twelve hours or more. Interference is only necessary when symptoms of distress arise, and then delivery may be completed with forceps, provided that the head is in the pelvic cavity.

If the patient is seen for the first time after labour has been in progress for some hours, treatment depends on the condition of the mother and child, the degree of fixation of the head and the condition of the uterus.

When *the membranes are unruptured* and the head free or not fixed firmly in the brim, version is the best treatment.

After *the membranes have been ruptured for some time*, and the uterus shut down firmly on the child's body, version becomes difficult or impossible. Treatment then depends on the condition of the mother and child. If signs of obstructed labour appear and version is impossible, forceps should be tried tentatively. Failing to deliver with forceps, pubiotomy or symphysiotomy is indicated if the child is alive, and perforation if it is dead.

It is always necessary to give anaesthesia to complete relaxation

Before determining that the head is fixed and the uterus in such a state of tonic contraction that version is impossible.

The deformity of the head resulting from a brow presentation will disappear in a short time.

In cases of brow presentation complicating contracted pelvis the treatment is primarily that of the contraction and not of the brow presentation.

E. HASTINGS TWEEDY.

FACE PRESENTATION.

FACE PRESENTATION is a condition of considerable gravity, although it frequently happens that a live child is delivered by the natural

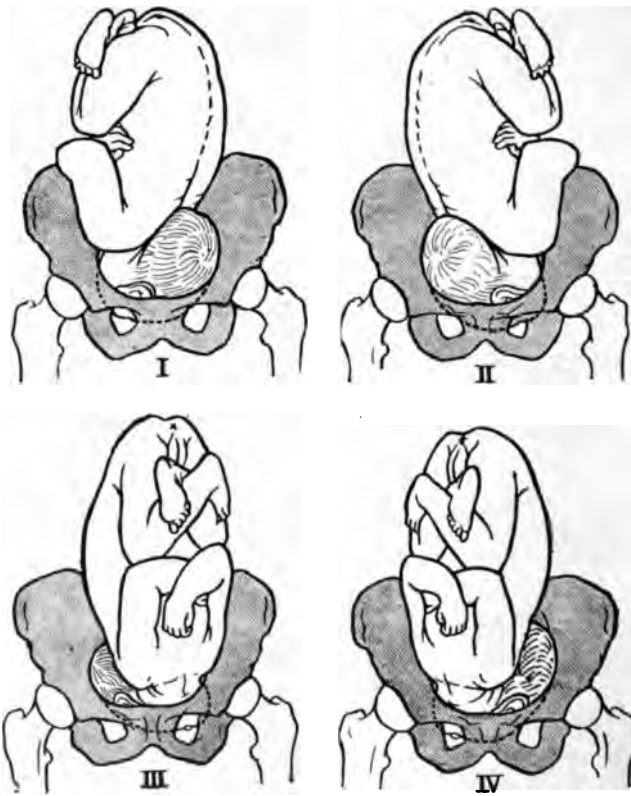


FIG. 1.—Face presentations. (From Jellett's Midwifery.)

forces. Like transverse presentation, it is often complicated by contracted pelvis, premature rupture of the membranes, obliquity of the uterus and pelvic tumours. These complications add greatly to the difficulty of delivery.

The diagnosis is readily made by abdominal palpation: (1) The convexity of the back, which is so marked in vertex presentation, is replaced by a concavity, the result of over-extension of the head. As a consequence of this the outline of the back is difficult to follow

from the breech to the neck. (2) Extension of the head presses the chest of the child against the uterine wall and renders palpation of the limbs extremely easy. (3) The marked prominence of the vertex on the same side as the foetal back, and on a higher level than the chin, is at once so striking and characteristic that it is not easily overlooked. (4) By Pawlik's grip the prominence of the head is felt at one side of the middle line. This is the most important sign. A deep sulcus separates the foetal head and back. (5) The foetal heart is heard best over the chest and not over the back.

Vaginal Examination.—Nothing distinctive of the presentation can be made out before the face comes down and fixes in the brim. Before this the empty lower uterine segment, the ballooning of the vaginal vault, and the protrusion of the membranes through the os indicate some abnormality, but not the particular one. Later in labour, if the head comes down, the various points characteristic of the face may be felt by vaginal examination. The supra-orbital ridges, the eyes, the nose and the chin are with care recognisable through unruptured membranes.

After the membranes are ruptured, these features are all made out with much greater ease, and in addition, the mouth, alveolar ridges and tongue can be felt and make the diagnosis certain. When the membranes have been ruptured for a long time, a large caput obscures the face and makes vaginal examination very puzzling. Whenever there is any doubt of what is felt by vaginal examination, the whole or half hand must be introduced.

An attempt should always be made to convert a face into a vertex presentation. It is frequently attended with the happiest consequences, and if it fails no harm can possibly result.

Schatz's Method.—An oblique uterus should be straightened before attempting to convert a face to a vertex. The head is then lifted out of the brim with a hand on either side, and the occiput pressed down towards the brim with one hand, while with the other the chest is pushed inwards to overcome the extension of the back. When the vertex is over the brim and the back is flexed, pressure on the breech increases the flexion and pushes the head down into the pelvis. If, however, flexion is incomplete, pressure on the breech causes re-extension, and the face presentation recurs. If the vertex is brought over the brim it should be pushed well through the inlet and kept in place by a tight binder pinned from above downwards. If the pelvis is too small to permit this, the head remains free above the brim, and the face presentation will very likely recur.

At a later stage of labour, when the os is opening and the face is partly fixed in the brim, many authorities recommend bi-polar

version as the readiest solution of the difficulty. On the other hand, I have been accustomed to leave these cases to nature, unless they are complicated by contracted pelvis, prolapse of the cord, or pelvic tumours.

Expectant treatment gives very good results. Either of the above methods is preferable to attempts to convert the presentation by internal manipulations. To do this is impossible, if the head is fixed in the brim, and, if it is not fixed, external manipulations are safer and more successful.

If it is decided to leave the case to nature, or if attempts to

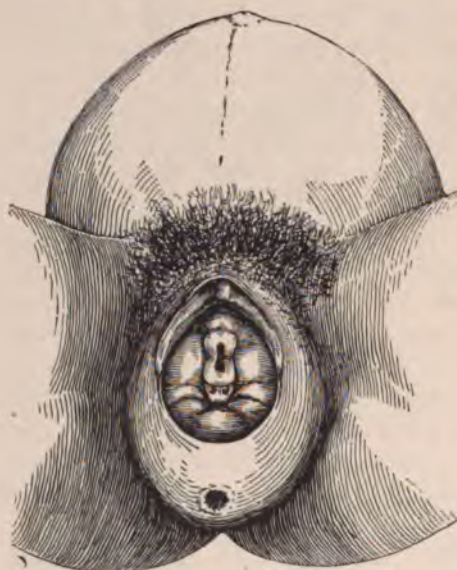


FIG. 2.—Face presentation.

convert the presentation fail, every precaution should be taken to prevent premature rupture of the membranes until the cervix is fully dilated and the head fixed in the brim by its largest diameter. The patient is kept in bed, efforts at straining are discouraged, the rectum is emptied by enema and the bladder by catheter if necessary. Abdominal pressure, manual or with a binder, is undesirable.

The second stage is likely to be prolonged and great delay may be experienced even after the face has reached the perineum.

This is particularly so when the chin points backward. Delivery with the chin behind is practically impossible; but this condition is rather in the nature of a bugbear than a frequent occurrence, for rotation of the chin to the front may occur even when the os has been fully dilated for hours and the face is down on the perineum. Rotation should be aided by placing a hand in the vagina and pushing the chin to the front during a pain. The other hand may be used on the abdomen to help rotation of the body. Pushing the head up into the pelvis between pains and before twisting the chin forward may be successful when the other method fails.

After anterior rotation of the chin has occurred, delivery follows by flexion of the head. Rupture of the perineum is a frequent

result, because of the large diameter that passes through the vulva.

As has been said, the face may remain on the perineum for a much longer time than is usually seen in vertex presentation. If neither foetal nor maternal symptoms of distress are manifested, this delay may be regarded with equanimity. There is very little objection to hastening delivery by forceps. Theoretically it is argued that the shape of forceps is not suitable to the shape of the head, and its use is said to excite the child to efforts at inspiration; neither of these statements has any practical force.

It must not be thought that every case of face presentation has a happy ending. Occasionally the face fails to enter the brim or is impacted in the pelvis. Labour comes to a standstill and signs of obstruction supervene.

These complications are due rather to contraction of the pelvis than to the face presentation, though, of course, the latter adds to the gravity of the condition. If obstruction occurs, the head should be pushed out of the brim and internal version performed. If maternal symptoms of distress arise while the child is alive, and the head is so fixed in the brim, or the



FIG. 3.—Face presentation deformity following delivery.

uterus so firmly contracted that version is impossible, forceps should be tried tentatively, and if this fails the pelvis should be enlarged by pubiotomy (preferably subcutaneous) or symphysiotomy, if the special instruments for pubiotomy are not available. The same line of treatment is indicated if foetal distress occurs first, but in these cases version is nearly always possible.

If the child is dead, and version is attended with difficulty, perforation through the mouth is an easy and successful operation.

In those rare cases in which the chin persistently remains behind and cannot be rotated to the front by the methods indicated, pubiotomy or symphysiotomy should be performed if the child is alive, and perforation if it is dead.

Great deformity of the head occurs as a result of face presentation, but need occasion no anxiety, as it disappears in a few days.

E. HASTINGS TWEEDY.

OCCIPITO-POSTERIOR PRESENTATION.

THE majority of cases of third and fourth positions of the vertex correct themselves spontaneously by anterior rotation of the

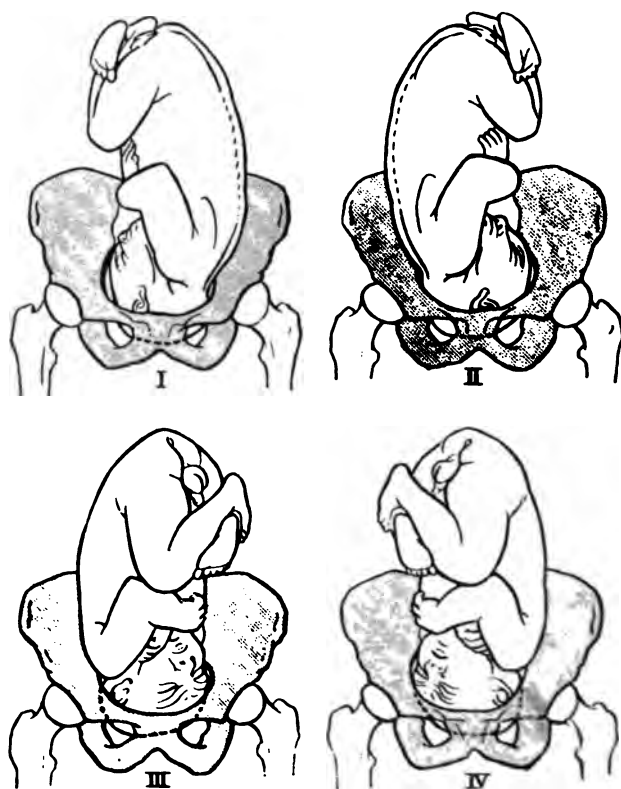


FIG. 1.—Vertex presentations. (From Jellett's Midwifery.)

occiput when it reaches the pelvic floor. Two conditions may interfere with anterior rotation, viz., insufficient flexion, usually the result of uterine inertia, and a weak pelvic floor, from relaxed or torn levator ani muscles. Application of forceps before the head lying in the third or fourth position, reaches the pelvic floor, is also a cause of persistent occipito-posterior presentation.

Diagnosis. Palpation reveals the limbs in front, prominent

easily felt, while the back is behind in one or other flank. The head is in the brim. The foetal heart is heard best in one or other flank, on the same level as in anterior positions of the vertex. By vaginal examination the large fontanelle is recognised in front near the pubes of one side of the middle line, and the small fontanelle behind near the opposite sacro-iliac synchondrosis. The sagittal suture lies in the plane of one of the oblique diameters of the pelvis. The head feels jammed against the pubes, whilst there is plenty of room behind towards the sacrum.

Treatment should at first be directed to overcoming the cause of the failure of rotation. If it results from insufficient flexion due to uterine inertia, the patient should be given a sedative: morphine and scopolamine, or a mixture containing 15 min. [U.S.P. 9 min.] of laudanum, 15 gr. of chloral hydrate and 15 gr. of potassium bromide. When she wakes the pains usually come on strongly and regularly, the head becomes properly flexed so that the occiput is the most advanced part of the vertex, and anterior rotation results.

It is advisable to give plenty of time in the second stage, as anterior rotation may occur after several hours. Even if this does not happen, delivery may be expected in the majority of cases. Advance of the head can be hastened by pressure on the fundus during the pains. Operative delivery is indicated whenever maternal or foetal symptoms of distress arise.

If rotation does not occur because of relaxation of the pelvic floor, this deficiency may be overcome by putting the hand into the vagina and pushing the occiput to the front during the pains. Twisting the head forward between pains is unsatisfactory, because it does not stay forward. To overcome this difficulty the usual



FIG. 2.—Moulding of head in persistent occipito-posterior presentation. (From Galabin and Blacker's Midwifery.)

146 Occipito-Posterior Presentation.

recommendation is to apply forceps immediately after rotation, but it is difficult to keep the head forward during the application of the forceps.

It is not safe to use forceps solely to rotate the head. If the head rotates during extraction, the blades should be re-applied. When this is being done an assistant pressing the head down may be able to keep it from slipping back into its original position. If the head does not rotate during extraction, no harm is done. It increases the liability to perineal laceration, because of the larger diameters of the fetal head that have to pass the vulva, and because the head has a tendency to slip out suddenly, if care is not taken to lessen the traction as the occiput appears.

E. HASTINGS TWEEDY.

PROLAPSE OF THE CORD.

ANYTHING that interferes with fixation of the presenting part predisposes to prolapse of the cord; therefore it is to be expected in cases of contracted pelvis, mal-presentations, hydramnios, hydrocephalus, etc. Normally the head accurately fills the lower uterine segment, preventing free communication between the fore-waters and after-waters. When the presenting part does not enter the brim, the lower uterine segment is empty; the whole force of the uterine contraction is felt on the unsupported membranes and is likely to cause premature rupture, the rush of escaping liquor amnii carrying down a loop of the cord into the vagina.

Very often a prolapsed cord appears at the vulva. If it does not it may be suspected in every case in which the presenting part is not fixed. It is a safe rule to make a vaginal examination in every case when the membranes rupture, and it is imperative if the presenting part is unfixed or if there is a mal-presentation. Recognition of the cord is easy when it is pulsating. If it is not, and there is any doubt, a loop may be pulled down for inspection.

Breech presentation is the most favourable for the child when the cord prolapses. The breech is softer and smaller than the head, and the cord escapes continuous pressure until the breech begins to descend, when rapid delivery is possible. For this reason many authorities recommend version as the best treatment in every case, except when delivery by forceps is possible. In transverse presentation version is necessary, but in presentation of the head prolapse of the cord practically always indicates contraction of the pelvis, which may be of such a degree that delivery of the after-coming head will be difficult or impossible. In these cases replacement of the cord should always be tried.

Re-position of the Cord.—The patient is placed in the cross-bed position and anæsthetised. The vulva and vagina are carefully disinfected. The operator should wear rubber gloves, as in all midwifery procedures entailing the introduction of the hand into the vagina. With the whole hand in the vagina the cord is pushed up into the uterus past the presenting part. As a rule, manual re-position is unsatisfactory, the cord coming down again immediately, because it is not carried high enough into the uterus. If a repositor

is used in conjunction with the hand, the cord can often be replaced to stay.

To make a repositor pass a piece of silk thread doubled through a No. 12 male catheter, and bring its loop out through the eye. If the silk is passed through a loop of the cord and back into the eye of the catheter, it can be held there by pushing home the stylet through it. The cord is held securely without constriction. Withdrawing the stylet a short distance immediately releases the silk, and the repositor can be removed without bringing down the cord. To replace the cord, a loop is caught in the repositor, as described, and pushed up to the fundus of the uterus. Any portion that remains in the vagina is carried up into the uterus with the hand and placed over prominent foetal parts. An assistant then pushes the head into the brim, the cord is freed from the silk by withdrawing the stylet and the catheter is removed, the hand being kept in the vagina to make sure that the cord does not come down again. A tight abdominal binder keeps the head pressed into the brim.

In cases complicated by prolapse of the cord it is always advisable to know the size of the pelvis; therefore, when the cord has been replaced, pelvimetry, preferably with Skutsch's pelvimeter, is indicated. Subsequent treatment depends on the size of the pelvis.

Occasionally prolapse of the cord occurs with the head well down in the pelvis. In multiparæ, if the os is three-quarters dilated or more, delivery by forceps is always possible, and, as a rule, may be accomplished rapidly enough to save the child's life, but it is always at the expense of a torn cervix, if delivery takes place through an os that is not fully dilated. In primiparæ, unless the os is fully dilated, it is hardly possible to deliver rapidly enough to save the child.

While preparing for any treatment, the patient should be kept in the knee-chest posture until she is to be anæsthetised. In this position the presenting part falls away from the brim and relieves the cord of pressure.

Re-position of a cord that has prolapsed through the vulva exposes the woman to the risk of infection.

Summary.—If the os is fully, or almost fully, dilated and the head fixed in the brim by its largest diameter, delivery by forceps is indicated.

If the same conditions obtain with the head unfixed, internal version and extraction should be performed, unless the uterus is in a state of tonic contraction. If the pelvis is too small to permit delivery of a living child, the best treatment is re-position as it

gives time for pelvimetry and preparation for pubiotomy or other operation necessitated by the contraction of the pelvis.

In transverse, brow and face presentations version is necessary.

No treatment is necessary if the cord is not pulsating unless there is some other complication of labour.

E. HASTINGS TWEEDY.

PROLAPSE OF LIMBS.

With small and premature children prolapse of an arm with the head may occur without causing any difficulty in delivery. When it occurs with a full-term child presenting by the head, it is usually an evidence of contracted pelvis. Prolapse of the arm is to be expected in transverse presentations. It occasionally occurs as a complication of vertex presentation in the second of twins. With the whole hand in the vagina the prolapsed arm is pushed up into the uterus and the head pushed down into the brim. Subsequent treatment depends on the size of the pelvis. In transverse presentations the arm goes up into the uterus, when the leg is pulled down.

Prolapse of a Leg.—This has no significance. It occurs in breech presentations and in small and macerated children presenting by the vertex.

E. HASTINGS TWEEDY.

TRANSVERSE PRESENTATION.

TRANSVERSE PRESENTATION is often complicated by abnormalities such as contracted pelvis, tumours, hydramnios and pendulous

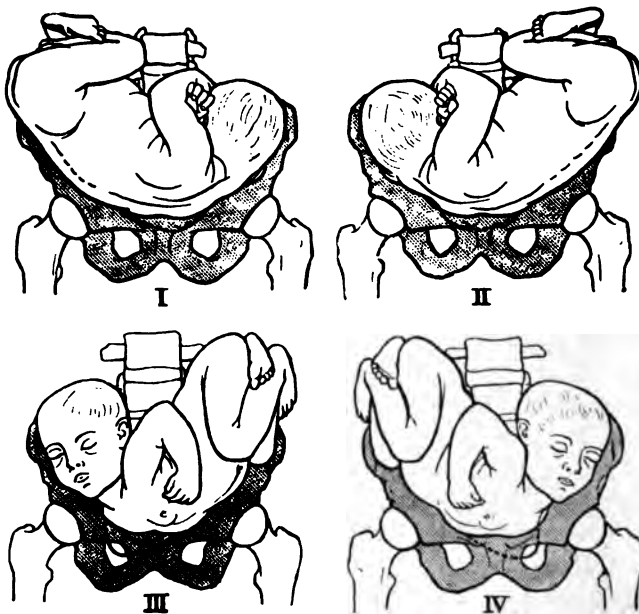


FIG. 1.—Transverse presentation. (From Jellett's Midwifery.)

abdomen. It is considered an unnatural presentation. Delivery of a normal-sized child through a normal pelvis is impossible.

The diagnosis can be made by palpation, supplemented by vaginal examination. Inspection generally suggests some abnormality. There is longitudinal shortening of the uterus, with widening of its lateral boundaries. The breech cannot be made out in the fundus nor the head in the brim. A word of warning is necessary. The term "transverse" is more or less a misnomer, as *the lie of the child is usually oblique*. It is often surprising to find the head fixed, but slightly to one side of the pelvic brim, suggesting the possibility that a few pains will suffice to bring it into its proper place. The head should not be fixed in any position but in the brim. Finding it immobile and at the side of the pelvis points to tonic contraction

of the uterus around the foetal body. When a condition such as this is encountered, palpation becomes difficult, and it is necessary to make a vaginal examination to ensure correct diagnosis.

The foetal heart is heard in the position which corresponds to the child's back.

The presenting part cannot always be felt before the membranes have ruptured. They protrude markedly through the os. Rupture of the membranes is frequently followed by prolapse of the arm or cord, possibly both. If this does not happen, and the presenting part cannot be recognised with one or two fingers, the obstetrician should not hesitate to pass the whole or half hand (four fingers without the thumb) into the vagina. This extended reach renders possible careful examination of the presenting part. A shoulder is easily mistaken for a breech or a head, but such a mistake is unpardonable. The spine of the scapula, the acromion and clavicle form the unmistakable shoulder-girdle, and the axilla and ribs are felt in close proximity, the latter being absolutely diagnostic of oblique or transverse presentation.

Other foetal parts may have to be differentiated. The hand is recognised by the fact that the thumb is not on the same level with the fingers, and has greater mobility than the great toe. The hand is continuous with the arm, and does not form an angle as the foot does with the leg. In the living child the hand closes when stimulated, a sign which need not be looked for.

The elbow is made out by its three anatomical points, the olecranon and two condyles, the absence of a patella and the spine of the tibia, the latter probably the most distinctive point on the knee.

It is easy to know which hand is presenting or prolapsed if it is grasped, as in shaking hands (approximating the thumbs). The foot is recognised by feeling the heel and the angle it makes with



FIG. 2.—Prolapse of the arm in transverse presentation.

the leg. The toes are all in line, but this not to be relied upon for diagnosis. The distinctive points about the knee are the patella and the spine of the tibia.

The course of transverse presentation is from bad to worse as labour progresses, and death is almost inevitable if the condition is not relieved. This being so, the more prompt the interference the better for the patient. Before labour starts, or early in labour, before the membranes have ruptured, it is often possible by external manipulation to bring the head over the brim. To do so the bladder should be empty and the patient anæsthetised. The latter, though not always necessary, is usually advisable. External version is more likely to succeed with a premature child six to seven weeks before full term, but should be tried at any period. When labour has started, the uterus will probably move with the child, and if this occurs, the abnormal presentation recurs as soon as the hands are removed from the abdomen.

Combined version offers greater prospect of success early in labour, before or shortly after rupture of the membranes. Theoretically combined version should have for its object bringing the head over the brim. Practically it is a mistake to waste time in endeavouring to do this, as combined podalic version is much easier, safer and more certain in its performance. Should there be a contracted pelvis, a pelvic tumour, or prolapse of the cord, it becomes the operation of choice.

It is not within the scope of this article to describe the operation of bi-polar version (*see* p. 461), but there is one point worthy of consideration, namely, that it is necessary to pass the whole hand into the vagina to get two fingers through the cervix.

Neglected Transverse Presentation.—In a neglected transverse presentation the os is gradually dilated by the pulling up of the cervix over the presenting part. In such a condition death of the child is probable, because of the diminution of the placental site due to tonic contraction of the uterus, but it should not be lightly assumed. Therefore internal version is the operation usually indicated.

Internal version becomes very difficult and dangerous after prolonged labour with ruptured membranes. Difficulty in turning usually means that the liquor amnii has drained away, and that the uterus is in a state of tonic contraction. Fœtal life is impossible under these circumstances, and it can therefore be laid down as an axiom that an extremely difficult internal version is unjustifiable. If this contention is true, it becomes all-important to differentiate easy and difficult cases. Rupture of the membranes for a long

time, with almost continuous contractions, tenderness of the uterus and formation of Bandl's ring half-way or more between the pubes and umbilicus, are highly suggestive of threatened rupture of the uterus, and indicate that version will be extremely difficult. If, in addition, the cord can be reached and is not pulsating, there is no reason to misjudge the condition.

It is doubtful if turning is ever the proper treatment when the child is dead. Decapitation is safer and much easier. It can be performed despite extreme tonic contraction; in fact, it becomes easier under these conditions.

Summary.—Every pregnant woman should be palpated six weeks before full term, and any abnormal presentation corrected by external version. If this is necessary, the patient should be seen once a week until labour starts.

If seen early in the first stage, external version under general anæsthesia should be tried, and, if unsuccessful, bi-polar version is indicated as soon as the os is big enough to admit two fingers.

Bi-polar version reaches the limit of practicability shortly after the membranes have ruptured. From this time on internal version is indicated as long as the child is alive.

When the child is dead, it should be decapitated, unless its mobility and the condition of the uterus clearly indicate that version will be easy.

E. HASTINGS TWEEDY.

TWINS.

HEARING two foetal hearts at different rates is the positive sign of twins. Another reliable sign is to feel three large parts, two heads and a breech or two breeches and a head. Occasionally it may be possible to outline the position of the foetus, but more often one child lies in front of and obscures the other, making diagnosis uncertain until the first child is delivered. Indeed, twins frequently are not suspected until one is delivered. Vaginal examination as a rule reveals nothing but the present of the first child. If a prolapsed, pulseless cord is associated with an audible foetal heart, the condition is obvious.

In order of frequency twins present as follows: (1) Both head; (2) one head, one breech; (3) both breech; (4) one head, one transverse; (5) one breech, one transverse; (6) both transverse.

The usual order of delivery is: (1) The first child; (2) the second child; (3) the united placentæ, or the placenta of the first child; (4) the placenta of the second child. Occasionally the placenta of the first child is delivered before the second child.

Frequently no treatment is necessary, the second child follows the first rapidly and normally. During the delivery of the first child the patient is managed exactly as in normal labour. The lie of the second is diagnosed by abdominal palpation. It is often difficult on account of retraction and thickening of the uterine wall. Under these circumstances a vaginal examination is desirable; if made, the membranes should be ruptured to facilitate delivery. Before rupturing the membranes it is well to remove the first child. The cord is tied in two places before being cut, as otherwise the second child might bleed to death because of a free vascular communication between the placentæ. The membranes are ruptured with a gloved finger or a small stylet. A hair-pin, heated red-hot and cooled in the antiseptic solution used for cleansing the vulva, makes a good stylet. After the membranes have been ruptured, the hand is kept in the vagina to prevent too sudden escape of liquor amnii, and to feel if the second child prolapses, and if the presenting part, head or breech, comes into the brim. An abnormal presentation should be immediately rectified.

At times the delivery of the second child, instead of following that of the first in a few minutes to an hour, is delayed for several hours, and days or even months may intervene between the delivery of the two children. Of course, delivery by forceps or breech is always easy, but it exposes the woman to the risk of serious post-partum hæmorrhage, if she is delivered when the uterus is in such a state of profound inertia. Treatment should be directed towards stimulating the uterus to contract, when natural or artificial delivery will be unattended with any serious consequences. Rupturing the membranes, passing a catheter, giving a hot enema and applying a tight abdominal binder may be sufficient to bring on contraction. If not, settling the patient comfortably and administering a sedative, such as $\frac{1}{4}$ gr. of morphine, or $\frac{1}{120}$ gr. of scopolamine, to enable her to get a good sleep, is frequently followed by normal uterine action. Finally, if the inertia persists, uterine tonics, such as 5 gr. of quinine every two hours for three doses, alcohol, strychnine, or ergotinin may be administered. If at



FIG. 1.—Twins. (From Galabin and Blacker's Midwifery.)

any time the foetal heart gives evidence of distress, delivery should be completed in the interest of the child.

Locked Twins.—Locking of twins may occur when the heads enter the brim, one slightly in advance of the other, the second head pressing into the neck of the first child, and preventing delivery; or when the first child presents by the breech and its head is caught by the second child lying transversely or longitudinally.

If the heads are down together, the patient should be anæsthetised and an attempt made to push the second head up into the uterus, when the first can be delivered with forceps. If the second head

cannot be pushed up, forceps should be tried, and if delivery is impossible the first head must be perforated.

If the breech is delivered with the head caught on the second child, the whole hand should be placed into the uterus and an attempt made to free the head. If this fails, the child is dead and decapitation is indicated. The second child is then delivered, and finally the head of the first child.

E. HASTINGS TWEEDY.

COMPLICATIONS AND ABNORMALITIES OF LABOUR, EXCLUDING MALPRESENTATIONS.

ABNORMALITIES OF THE MATERNAL SOFT PARTS AFFECTING LABOUR.

Malposition of the Cervical Canal.—Under this heading are placed those cases in which the cervix is displaced anteriorly, posteriorly, or very occasionally laterally.

Of these the most common is the posterior displacement, so that the presenting part of the fœtus bulges down the anterior wall of the lower uterine segment.

This condition is present to a slight degree in quite a number of cases, and is usually rectified by nature, but when more marked, may form a definite obstruction to delivery.

It is important that the condition be recognised early in labour, as the continuous pressure exerted by the fœtal head pressing the lower uterine segment against the symphysis may so cut off the blood-supply as to cause sloughing of this part, and cases have been recorded in which the anterior wall of the cervix was torn completely away from the body of the uterus.

The cause is commonly obliquity of the whole uterus, but may also be over-development of a part of the lower uterine segment, or the two combined. Also in early rupture of the membranes the anterior lip of the cervix occasionally becomes caught between the descending head and the symphysis pubis, and so is prevented from retracting, in which case it becomes gradually pushed down and stretched out over the head.

In diagnosing these conditions it is important that the case is not taken for one of atresia of the cervix, and incisions made through the bulging lower uterine segment.

If the cervical canal cannot be located on the first examination, then an anæsthetic should be given, and a careful exploration of the lower uterine segment made.

The woman must be encouraged not to bear down, and during the pains a finger must be hooked into the os and attempts made to rectify the malposition. If this is successful, examinations should be made from time to time during the first stage of labour to ascertain that the condition has not recurred.

158 Abnormalities of the Maternal Soft Parts.

But if this method fails, then the cervical canal must be dilated with hydrostatic bags. Of these Champetier de Ribes's is the best, commencing with a small size, and, if necessary, replacing it with a larger one.

If the anterior lip of the cervix, owing to early rupture of the membranes, becomes nipped between the head and the symphysis pubis, it should, during the pains, be pushed upwards and forwards with the fingers until it eventually slips over the vertex. One should be on the look-out for this latter condition in those cases in which an examination has been made early in the first stage and everything found to be apparently normal, and then in spite of good pains, the head does not advance as it should.

Atresia of the Cervix.—When complete occlusion of the cervix is present it must have taken place after conception. The condition is very uncommon, and is due to the healing either of some injury (as from the knife or cautery) or of ulcerated surfaces. On examination there may be no signs of a cervical canal, or its position may only be recognised by the presence of scar tissue; care must be taken not to mistake malposition of the cervical canal for atresia.

The treatment consists of making an incision, if possible in the position of the cervical canal, and then dilating up with some form of metal dilator, finally leaving the case to nature. But if dilatation does not take place, and the cervix commences to split in different directions, then it is best to perform the operation known as *anterior hysterotomy*, which should be done as follows:

The cervix having been pulled down with volsella as far as possible, a transverse incision is made across the anterior fornix, and the bladder is separated from the anterior surface of the uterus by means of the fingers or a wad of dry gauze. Then an incision is made from the external os (or the opening previously made in the lower uterine segment) up the middle of the anterior wall of the uterus, of sufficient size to allow of delivery of the child: when this is completed and the placenta and membranes have been removed, the uterine incision should be sutured with catgut or silk and that in the anterior fornix with catgut.

Rigidity of the Cervix.—This may be either (1) functional, or (2) organic.

(1) *Functional rigidity* occurs most commonly in primiparæ, more especially in elderly ones. The cause is not definitely known, but it is more common when the membranes rupture early, thus allowing the head to press on the lower uterine segment, and by irritation either of the nervous or muscular mechanism causing spasm.

The cervical canal is usually taken up without trouble, then the os, which will admit one or two fingers, remains in this condition for many hours in spite of frequent pains, and on examination a hard, thin, unyielding edge is felt.

This rigidity is usually overcome by means of antispasmodic drugs. Chloral (gr. 40 by the mouth, or ʒj by the rectum), or inj. morphinæ hypoderm. (m5) [U.S.P., morphinæ tartratis, gr. $\frac{1}{4}$], will often be found to suffice. In some cases chloroform will be necessary, and if even this fails, then operative measures (which will be described later) will have to be resorted to.

(2) *Organic rigidity* may be due to the following causes:

(a) Cicatricial contraction and scarring following trauma, ulceration or chronic inflammation.

(b) Hypertrophic elongation.

(c) Cervical fibroids.

(d) Carcinoma of cervix.

Considering first the cases headed (a) and (b), these may sometimes be mistaken for functional rigidity, and can only be differentiated by a careful examination.

When the patient has been five or six hours in labour with good pains and no change in the size of the os, mechanical dilatation must be resorted to. If the canal will admit two fingers, a de Ribes's bag should be inserted, otherwise the cervical canal should be dilated with metal dilators until of sufficient size to admit a bag.

If the rigidity is not overcome by this method of treatment, dilatation may be brought about by incisions. Some advise multiple incisions radiating round the cervix. Personally, I consider this dangerous, from the fact that one of the incisions may give way more than the others, resulting in a tear going up into the cellular tissue or even into the peritoneal cavity; and these irregular tears are difficult to suture, and may give rise to severe hemorrhage not easily controlled, whereas the operation termed anterior hysterotomy (previously described) gives a clean cut, from which there is very little bleeding and which is easily sutured.

Cervical fibroids, if small and near the mucous surface, may be shelled out after the cervix has been dilated sufficiently by one of the methods already described; after their removal dilatation will go on normally.

When it is impossible to shell them out and they are not large enough to cause actual obstruction in the pelvic cavity, the cervical canal must be enlarged by incision and delivery completed; but if it would be impossible to deliver the child through the pelvic canal owing to the size of the fibroids, Cæsarean section must be done.

160 Abnormalities of the Maternal Soft Parts.

Carcinoma of Cervix. If carcinoma is discovered in the early months of pregnancy and is operable, there is no doubt that abdominal hysterectomy by Wertheim's method is indicated. But if the condition is not recognised until the patient is in labour, then the course to be taken depends on the condition and extent of the growth.

When the growth is operable, the child should be delivered by Cæsarean section, and this followed by a complete hysterectomy following Wertheim's technique as far as possible.

When the growth is inoperable, if it is possible by means of hydrostatic bags or incision to deliver a live child without immediate danger to the mother, this should be done; but the hæmorrhage is in some cases so severe and so difficult to control that it is far safer to do Cæsarean section, although there is no possibility of following this up with hysterectomy. As the maternal life is doomed, the utmost should be done to obtain a live child.

JAMES WYATT.

AIR EMBOLISM.

THIS accident in labour is very rare. It is due to the entrance of air into the veins by way of the open mouths of the uterine sinuses. This may occur when the delivery of the child is completed, or when any obstetric operation is performed, with the patient in the semi-prone position, either with or without an anæsthetic.

When the patient is in the usual obstetric position, unless she is carefully watched, she is very apt to get beyond the strictly left lateral into the semi-prone position. This is particularly the case on the modern spring bed. In addition, owing to the central part of the bed sinking, the hips are often at a higher level than the rest of the body. With the body in the semi-prone position, if the birth canal is opened as by the passage of the child on the introduction of the arm of the obstetrician or of an instrument, the abdominal wall may fall forward and air be drawn into the uterus.

Air embolism will not occur while the placenta remains attached. Even after its separation, no trouble will probably arise unless the cervix is blocked by the placenta or clot. If this happens, the contractions of the uterus may force air, which has gained access to its cavity, into the uterine veins. Placenta prævia is said to favour this accident. Another cause to which this air embolism has been attributed is the use of a Higginson's syringe for intra-uterine douching, air having been forced into the uterus by this means.

As regards prophylaxis, the most important point is to avoid doing obstetric operations, especially version and extraction of the placenta, with the patient in the faulty position described. Either she should be in the dorsal position or, if she is on her side, care should be taken that the shoulders are raised and that she does not lie on her more or less on her face. The dorsal position is the best. The same advice applies to completing the delivery of the child.

Higginson's syringe should never be used for intra-uterine douching; the best and simplest apparatus is a glass vaginal nozzle, about 2 feet of rubber tubing, and a glass funnel; the solution to be used is placed in a jug and this is given with the funnel to the nurse, with instructions to keep the funnel full and to inform the obstetrician when the last of the fluid has been

poured from the jug. The obstetrician has both hands free and there is no danger of injecting air.

Air embolism, when it does occur, frequently causes a convulsion and sudden death, the symptoms closely resembling those due to pulmonary embolism. In other cases, according to Dr. John Campbell, the most prominent symptom is recurrent attacks of dyspnœa; whereas, in pulmonary embolism the first attack is the worst and symptoms gradually improve afterwards, in air embolism the attacks continue and the patient may gradually get more and more exhausted and eventually die.

The recurrent attacks, according to Campbell, are due to more air being driven into the veins with each successive contraction of the uterus.

Treatment when Embolism has Taken Place.—The hand should be at once introduced into the uterus and the placenta, if still there, and all clots removed, and the uterus should be freely washed out with saline solution.

• Subcutaneous infusion of saline should be administered. Stimulants should be given, ammonia and digitalis being the most valuable. Artificial respiration may be practised. Inhalation of oxygen should, if possible, be given.

After an attack of embolism the patient should remain in bed for five or six weeks.

C. E. PURSLOW.

CONTRACTED PELVIS.

IN the management of childbirth, in which the pelvis is contracted, obviously the main object in view is to procure the birth of a living child with the least possible risk to the mother. The difficulty is that in many cases the interests of the child and the mother are antagonistic to each other.

Broadly speaking, there are two main classes of case: (1) Where the pelvis is too small to allow a viable child, which is likely to survive, to pass through it; and (2) where the pelvis is large enough to allow a child to pass, which is not only viable but likely to survive. There are many cases on the border line between these two classes, and no hard-and-fast line can be drawn between them. Further than this, it should never be forgotten that the size of the pelvis by itself is a bad criterion to go by except in extreme cases. Other very important factors are the size and consistence of the child's head and the vigour of the uterine contractions. Hence, in the majority of cases, the probable line of treatment is inferred from the size of the pelvis, but is checked and, if need be, altered by the fit of the child's head into the pelvic brim.

One of the chief reasons why every woman, who is pregnant for the first time or has had difficulty in a previous confinement, should be seen by her medical attendant at about the twenty-eighth or thirtieth week of her gestation, is to give him an opportunity of discovering whether her pelvis is of the average size. In the first instance the external measurements should be taken with callipers, that is to say, the interspinous and intercrystal measurements and the external conjugate measurement. For the interspinous measurement the woman lies on her back, and the tips of the callipers are placed just *outside* the anterior superior spines of the ilium. The normal measurement is about 10 inches. The intercrystal measurement is taken with the woman in the same position and with the tips of the callipers set so that they will just pass over the widest parts of the crests of the ilium, or if the widest part is at the spines, at a point on each side $2\frac{1}{2}$ inches behind the spines. This measurement should be about $10\frac{3}{4}$ inches. Both the relation of these two measurements to each other, and also the absolute size of the

measurements, give information as to the size of the true pelvis. If the measurements are smaller than normal, but are unaltered in their relation to each other, the pelvis is probably generally contracted. It is also possible that there may be a transversely contracted pelvis, but in that case the external conjugate (*see below*) will be longer instead of shorter than usual.

If the distance between the spines is the widest measurement, the pelvis is rachitic, flat and generally contracted. If the difference between the interspinous and intercrystal measurements is less than it should be, the pelvis is probably flat and rachitic, but occasionally the pelvis is rachitic and generally contracted, but not flattened.

The external conjugate measurement, taken from the tip of the last lumbar spine to the front of the symphysis pubis, is not so useful a guide, but if it measures more than $7\frac{1}{2}$ inches, it is probable that there is no flattening of the pelvis while if it is less than 7 inches, there is likely to be some contraction of the conjugate.

Other measurements which should be taken, when one of the rarer kinds of contracted pelvis is suspected, will be mentioned later.

At the same time that the pelvis is measured it should be noticed whether there is any deformity of the spine especially in the lumbar region, whether the legs are equal in length, whether there is any asymmetry of the pelvis, and whether the great trochanters and sacrum bear their usual relation to the other bones.

The next step is to see whether the sacral promontory can be felt by vaginal examination or whether there is any abnormal bony projection into the true pelvis. In order to ascertain whether the sacral promontory can be reached it is best to have the patient on her side and to insert at least two fingers into the vagina and to push them almost vertically upwards. If the promontory cannot be reached in this way, it may be inferred that there is no serious contraction of the conjugate, supposing that the fingers are of ordinary length and that the patient is fairly tolerant of vaginal examination. If the promontory can be reached, the diagonal conjugate should be measured by placing the tip of the second finger against the promontory, and marking with a finger-nail of the other hand the point at which the lower border of the symphysis pubis touches the radial border of the examining hand. The distance between the tip of the second finger and the finger-nail mark is then measured with a tape measure or with callipers. If $\frac{3}{4}$ inch is deducted from this measurement, a rough

estimate of the length of the true conjugate is obtained. Sometimes the difference between the two conjugates is an inch or even more, sometimes even less than $\frac{1}{2}$ inch; but the exact length of the true conjugate is not so great a help to the correct treatment of the case as the fit of the foetal head into the pelvic brim, which is the all-important point. The estimate, however, of the true conjugate made from the length of the diagonal conjugate is of use as a guide to the line of treatment which will probably be necessary.

At the same time that the diagonal conjugate is measured, an attempt should be made to get a general idea of the characters of the pelvis by vaginal examination. The chief points to be noticed are: To what extent the circumference of the pelvic brim can be traced out with the finger; (if this can be easily done, there is general contraction of the pelvis); whether the pelvis is symmetrical; whether the sacrum projects or is flattened, and whether there is plenty of space in the hollow of the sacrum.

When some idea of the amount and kind of contraction present has been obtained by the foregoing methods, the treatment to be adopted should be planned on the following lines.

In the first instance it will be best to discuss the case of a primigravida seen about the twenty-eighth week of gestation, whose pelvis is flattened, but not generally contracted. In such a case there will be no history of previous labours to guide one, and to some extent the first labour must be regarded as a trial one, in which the capabilities of the uterus and pelvis are to be tested as a guide to the future.

(1) *If the true conjugate is estimated as being at least $3\frac{3}{4}$ inches in length*, the probability is that the best treatment will be to allow the patient to go to term and to allow the head to be moulded until natural birth can occur, but it will be wise to see the patient at intervals of about a week, towards the end of her pregnancy, and to test the fit of the head into the pelvic brim. Of course, if the head is not presenting, the child must be turned by external version (under anaesthesia, if it should be necessary) into the cephalic lie. In doing this, it is essential that the presenting part be thoroughly disengaged from the pelvic brim before the head is pushed in the direction of the foetal limbs, and the use of the Trendelenburg position is often an aid to this manœuvre. To test the fit of the head into the brim, the patient lies in the dorsal position, one or two fingers of one hand are placed in the vagina, and the thumb of the same hand is placed just above the symphysis pubis. With the other hand the foetal head is pushed

firmly downwards *and backwards* in the axis of the pelvic brim. It may be necessary to get an assistant to help in doing this, and in some cases, in which the patient resists or the abdominal walls are very tense, the use of an anæsthetic may be advisable. In this way it is ascertained whether the head will engage or whether it overlaps the symphysis pubis. So long as it will engage and there is no overlapping, the woman may be allowed to proceed with her pregnancy; but if, after a week's interval, it is found that the head has become too large for this, labour should be induced. Another way of ascertaining the date at which labour should be induced is to place the patient in the sitting posture for twenty minutes, and if at the end of that time it is found that the head has not entered the brim, the time for induction has arrived. It is, however, very rarely necessary to induce labour unless the true conjugate is smaller than $3\frac{1}{4}$ inches, and statistics show that the prognosis is better for the child when *moulding* and natural delivery are allowed to take place in cases where this is possible than when labour is induced or the head is pulled through the brim with the forceps.

Supposing that the pregnancy has been allowed to go to term, the patient should be kept recumbent during the first stage of labour in order to prevent, if possible, premature rupture of the membranes. If the membranes rupture early, probably the head will not descend into the cervix, and it will be best to insert a Champetier de Ribes' bag, both to dilate the cervix and to retain as much as possible of the liquor amnii.

Any abnormal deviation of the uterus should be corrected by altering the posture of the patient and, if necessary, by the use of a pad and binder. No oxytocic should be given and the head should be allowed to be moulded as long as is safe for mother and child. The second stage of labour may be allowed in this way to last as long as six hours or even longer. The necessity of interference to terminate labour in the interest of the mother will be shown by one or more of the following signs: A progressive rise in the pulse rate in the intervals between the pains; a rise of temperature to 100° F. or more; the appearance of Bandl's ring; the occurrence of violent and frequent uterine contractions.

In the same way it will be necessary to terminate labour in the interest of the child, if the fetal heart is slowing. For this reason, during a long second stage, the fetal heart should be listened to and counted at very frequent intervals. Another indication, of course, of fetal distress would be the appearance of meconium while the head was presenting.

If the second stage of labour is well advanced without the head having become fixed in the pelvic brim, it is well to place the woman in Walcher's position in order to assist the head to become engaged. This is better than waiting until the application of the forceps becomes necessary and then applying it in Walcher's position while the head is still above the brim. When for one or more of the foregoing reasons it has been decided that labour must be ended artificially, the first thing to do is to attempt delivery with the *axis-traction forceps*, and this will almost certainly be successful in dealing with a pelvis of this size. Walcher's position will of course be used, if need be, and in this event the operator will have to sit upon the floor. If, however, the child is already dead, craniotomy will probably be easier and safer for the mother.

Many authorities consider that it is not right to apply the forceps to the head while it is still above the brim and not engaged, for if the head is pulled very forcibly past the obstruction (which it will probably be necessary to do in such a case), the child is almost certainly killed and there is considerable risk of serious damage to the tissues of the mother, but it is better to make a careful attempt with the forceps even under these circumstances than to perforate a living child, supposing that other methods of delivery are considered inadvisable. There is nothing worse than the use of blind brute force in making attempts to deliver with the forceps. Further, it may be said that in these cases the continued use of the forceps is not justifiable if, after long moulding, the head distinctly overlaps the pelvic brim, if there is posterior parietal obliquity, or if two attempts with moderate traction in Walcher's position have ended in failure, that is to say, traction not greater than can be exerted by the forearms only. The question whether the head is well engaged and moulded is very important. Thus in some cases, where the true conjugate is only $3\frac{1}{4}$ inches, the use of the forceps is absolutely sound because the head is well engaged and moulded, whereas in other cases, where the same measurement is $3\frac{1}{2}$ inches, the use of the forceps is unsound because this engagement and moulding have failed to occur.

Another method of treatment, which was formerly advised for a flat pelvis with this degree of contraction, is *prophylactic podalic version*, that is to say, turning the child so that the breech presents early in labour or not later than the beginning of the second stage. Generally speaking, the results obtained are not so good as those from moulding and the use of axis-traction forceps, but in certain special cases version is good treatment. These cases are: (1) Where there is posterior parietal obliquity, that is to say, when

the sagittal suture lies nearer the symphysis than the promontory ; (2) where the pelvis is obliquely contracted and the occiput lies on the smaller side of the pelvis. In this latter case the right leg of the child should be brought down, if the right side of the pelvis is the larger, or the left leg, if the left side is the larger.

All the methods of treatment likely to be necessary for a pelvis of the foregoing size have now been mentioned. If, however, they fail, the case should be treated as though it belonged to the class of contracted pelvis, which comes next in point of size.

When the woman has had children before, the results of previous labours will be a very helpful guide to the treatment to be adopted.

If general contraction is present, the case should be treated in the same way as a flat pelvis, of which the true conjugate is $\frac{1}{2}$ inch shorter, except that podalic version should never be done in these cases.

It will be noticed that no mention has been made so far of symphysiotomy or of hebosteotomy (pubiotomy). The sphere of these operations will be discussed separately, partly because most authorities agree that they are only suitable for hospital practice and partly because the exact indications for them are as yet by no means settled.

(2) The next class of case to consider is that of the flat pelvis, where there is no general contraction, and whose *true conjugate measures from $3\frac{3}{4}$ to 3 inches*. The best treatment in the majority of these cases is induction of premature labour, but the advisability and date of the induction are not to be settled simply by the size of the true conjugate. The date is ascertained by periodically testing the fit of the child's head into the pelvic brim in the way already mentioned, and in the interests of the child it is not advisable to induce earlier than the thirty-fifth or thirty-sixth week of pregnancy. The mortality among children born earlier than the thirty-fifth week is so great that this method of treatment becomes at this time only slightly better than perforation of the head of the living child. The alternative treatment in most cases is Cæsarean section at term, but it must be remembered that though this gives a much lower mortality for the child, the risk is certainly somewhat greater for the mother, the respective mortalities for the mother being less than 1 per cent. and from 2 to 3 per cent. under favourable conditions. The position must be fully explained to the parents and induction before the thirty-fifth week should only be performed, if the parents insist upon it. In pelves of this class, that is to say, where the true conjugate measures from $3\frac{3}{4}$ to 3 inches, the history of previous

labours, if any, and of the results of the treatment adopted will be of the greatest assistance. In default of this guide the first labour must be treated to some extent as a trial one, and the fate of the child risked rather more than would otherwise be the case.

When a woman is found on examination at the twenty-eighth week to have a pelvis with a conjugate probably of this size, the fit of the head into the brim should be tested and if it is found to enter easily, she should be seen again in a week or a fortnight's time and so on at intervals until the fit is a close one, when labour should be induced, if the thirty-fifth week has been reached; or if pregnancy has not yet gone so far, the situation should be fully explained to the parents and they must choose between induction at this early date and Cæsarean section at term.

When there is general contraction and the true conjugate is estimated or known to measure from $3\frac{1}{4}$ to 3 inches, the rule again applies that the case should be treated as though the pelvis were a purely flat one with a true conjugate measuring $\frac{1}{2}$ inch less.

(3) For the next class of case, in which *the true conjugate measures from $2\frac{1}{4}$ to 3 inches*, the best treatment is Cæsarean section at term, but if the parents refuse this, induction may perhaps be done if the true conjugate is not less than $2\frac{3}{4}$ inches in a flat pelvis or 3 inches when there is general contraction, though it is extremely improbable that the child will be reared.

(4) Finally, when *the true conjugate is only $2\frac{1}{2}$ inches or less*, Cæsarean section at term ought to be done. This is safer for the mother than craniotomy in such a small pelvis, and should ensure the delivery of a living child. The only alternative is the induction of abortion before the sixth month. The same rule applies to the treatment of a generally contracted pelvis with a true conjugate of $2\frac{3}{4}$ inches or less.

Turning now to cases in which the patient is actually in labour when first seen, the treatment should be conducted on the following lines:

In Class 1, *i.e.*, where *the true conjugate is $3\frac{3}{4}$ inches or more*, the treatment will be exactly the same as that described above, where a woman with this size of pelvis has been allowed to go to term. At the end of labour it will be well to insert the whole hand into the vagina after thorough sterilisation of the hand and vulva (and preferably with the hand clothed in a sterilised rubber glove which has a gauntlet long enough to reach above the wrist), and then to measure the length of the true conjugate by trying how many knuckles will fit in between the promontory and the back of the

symphysis pubis. The actual length can be measured on the hand after withdrawal.

In Class 2, *i.e.*, where *the true conjugate measures from $3\frac{1}{2}$ to 3 inches*, a great deal depends on the relative sizes of the child's head and of the pelvic brim. Hence the patient should be examined under anæsthesia *early* in labour exactly as would be done in a case where the fit of the head into the brim was being tested in order to settle the date of induction of premature labour. In this way an attempt is made to ascertain whether the head is likely to pass the brim. If this seems probable, the case is treated as though it belonged to the preceding class. If, on the other hand, it seems unlikely to occur, the choice in most cases will lie between Cæsarean section, provided that the child is alive and that it is improbable that the woman's genital passages have been already infected, and craniotomy where the child is dead or infection of the genital passages is thought to have occurred already. Another point which would tend to make the operator decide against Cæsarean section would be the fact that the woman had been long in labour at the time that she was first seen, so that the uterus had become over-retracted, but recent statistics seem to show that Cæsarean section under these circumstances is less dangerous than it was at one time thought to be.

In Class 3, *i.e.*, where *the true conjugate measures from $2\frac{1}{2}$ to 3 inches*, practically the same treatment will apply as for a case of this class seen during pregnancy, except of course that induction of premature labour is out of the question, that is to say Cæsarean section or craniotomy should be done according to the indications just explained, but if the head does not seem to overlap the brim appreciably, as is just possible in a few exceptional cases where the pelvis is one of the larger examples of this class, a short trial of the axis-traction forceps may be made in Walcher's position. No attempt whatever must be made with the forceps, if there is any great disproportion between the head and the brim.

In Class 4, *i.e.*, where *the true conjugate measures less than $2\frac{1}{2}$ inches*, Cæsarean section is the safest treatment for the mother under any circumstances. If in such a case Cæsarean section is done and the woman has probably been already infected, the uterus should be everted before being opened and the abdominal cavity and wound carefully protected with sterilised towels. After the child has been delivered the uterus should be removed. Where, however, not only are the mother's passages already infected but the child is also dead, it is safest to remove the uterus unopened with the child *in situ* by cutting through the vagina below a

pair of Wertheim's clamps applied between the vagina and the uterus.

When Cæsarean section is done for contracted pelvis the question of sterilisation of the patient will arise. There is a good deal of difference of opinion on this question, but the writer believes that if the parents strongly desire it, it can hardly be refused, though in the case of a first pregnancy it should be avoided, if possible, for otherwise everything is staked on the life of a single child. There are many different methods of sterilisation in use by different operators. One of the simplest and most satisfactory is division of the Fallopian tubes, followed by burying the uterine ends of the tubes between the layers of the broad ligaments.

In cases of contracted pelvis where craniotomy has been done and there is a difficulty in delivering the trunk of the child, a very useful little operation is that of *cleidotomy* or division of the clavicles. In order to perform it two fingers of the left hand are passed up first to one and then to the other clavicle of the child and under cover of these fingers a long pair of blunt-pointed scissors is used to divide each clavicle in turn.

In the delivery of a child, which is presenting by the breech, through a contracted pelvis it is well to discover whether or no the arms are extended *before* the shoulders engage in the brim by passing a hand up into the body of the uterus past the body of the child and, if they are extended, to bring them down at this early stage. After they have been brought down, the head should be delivered by both jaw and shoulder traction used *in the axis of the pelvic canal*.

In cases of transverse lie complicated by contraction of the pelvis external cephalic version should, if possible, be done, and then the treatment proper to the relative sizes of the head and pelvis adopted, but if cephalic version is not found to be possible, podalic version may be done when the pelvis is merely flattened and the true conjugate measures at least $3\frac{1}{4}$ inches.

The Sphere of Hebosteotomy (Pubiotomy) and Symphysiotomy in the Treatment of Contracted Pelvis.—It seems to be generally agreed that of these two operations hebosteotomy is the better, but by either operation an average increase of $\frac{1}{2}$ inch in the true conjugate can be obtained. Since the increase in size thus obtained is so small, it follows that the relative sizes of the head and pelvis must be determined with great care before anything of the sort is done, for it only leads to disaster to drag too large a head through a divided pelvis, and the performance of craniotomy or of Cæsarean section after division of the pelvis would only be a

disaster of another kind. Numerous accidents have been reported as the result of division of the pelvis, such as serious hæmorrhage, serious tears of the vulva and vagina, injuries to the bladder, infection of the wound, incontinence of urine, and the maternal morbidity following these operations has been computed at from 40 to 60 per cent. Further, the maternal mortality has been reported by different operators as having been from 2 to 8 per cent., so that from the mother's point of view there is little to choose between division of the pelvis and Cæsarean section. From the child's point of view, on the other hand, Cæsarean section is infinitely the better, for the foetal mortality after division of the pelvis seems to be as high as 7 per cent. Hence Cæsarean section is to be preferred to division of the pelvis, unless there is some special contra-indication to the former operation, such as possibly the presence of sepsis, or perhaps when labour is very far advanced. On the other hand, division of the pelvis is preferable to the forcible use of the forceps above the brim of the pelvis, perhaps to version, and to craniotomy on the living child, provided that the true conjugate measures more than $2\frac{3}{4}$ inches and that the disproportion between the head and the brim is only slight; and provided also that the patient is either in hospital or, at any rate, under such conditions as will suffice to meet the possible serious complications of the operation. (*See also* Pubiotomy, p. 446, and Symphysiotomy, p. 452.)

THE RARER FORMS OF CONTRACTED PELVIS.

The Malacosteon or Osteomalacic Pelvis.—The most favoured treatment for this kind of pelvis has hitherto been Cæsarean section together with removal of the ovaries at term. The ovaries have been removed, because their removal has been followed in some cases by cure of the disease. Other cases have been treated by expanding the softened bones of the pelvis with the hand and delivery of the child with the forceps.

Recently Bossi has introduced the treatment of this condition by injection of adrenalin. The method usually employed has been the subcutaneous injection of 0·5 cubic centimetres of a 1 in 1,000 solution daily for a month or more, until the symptoms disappear. This treatment has not always been successful and will in most cases have to be combined with Cæsarean section, but it has been sufficiently successful to justify a trial of it being made in any case of puerperal osteomalacia.

The Pseudo-osteomalacic Pelvis.—If the deformity is at all pronounced, Cæsarean section will almost certainly be necessary.

If the deformity is only slight, the case may be treated in the same way as the more common forms of contracted pelvis.

The Kyphotic Pelvis.—In a pelvis of this kind the chief difficulty is likely to occur at the outlet. For this reason some measurements have to be taken besides those already described. The transverse measurement of the outlet (normally 4 inches) is taken either with callipers or with a tape measure between the middle points of the outer edges of the ischial tuberosities. The antero-posterior diameter of the outlet (normally 5 inches) is taken from the lower end of the sacrum (or of the coccyx, if it is ankylosed) to the lower edge of the symphysis pubis.

Version should never be done in these cases; otherwise the principles of treatment are the same as those of the more common types of contracted pelvis. If the transverse diameter of the outlet is less than $2\frac{1}{2}$ inches, Cæsarean section is safer than craniotomy.

Robert's Pelvis.—In this pelvis there is great contraction in every diameter, but the width of the sacrum is very greatly smaller than normal, and this is shown by a great decrease in the posterior interspinous measurement, the measurement between the two posterior superior spines of the ilium, which is in normal pelvis rather more than $3\frac{3}{4}$ inches. Cæsarean section is the proper treatment.

Spondylolisthetic Pelvis.—The treatment to be adopted here depends upon the general principles, which have been stated for the commoner forms of contracted pelvis. In many cases Cæsarean section will be necessary. It should be remembered that this variety of deformity is liable to increase as time goes on, so that in the event of a second pregnancy the pelvis may be found to be more contracted than it was at the time of the first labour. Again, owing to the contraction of the outlet in this type of pelvis, version should never be performed, though it is unlikely that the contraction will be so slight that the idea of version will be entertained.

Oblique Pelvis.—There are three main types of pelvis which are oblique, Naegele's pelvis, the scoliotic pelvis, and the oblique pelvis due to some shortening of one leg or disease of one hip-joint.

Certain additional external measurements are of use in these cases to help to determine the degree of deformity present, although there is no other class of pelvis in which an internal examination is more necessary to detect the exact degree of deformity. These measurements are: (1) From the posterior superior spine of one side to the anterior superior spine on the other: these two measurements should be equal and about $8\frac{3}{4}$ inches in length;

(2) from the posterior superior spine of one side to the opposite ischial tuberosity; (3) from each anterior superior spine to the spine of the last lumbar vertebra; (4) from the posterior superior spine of one side to the great trochanter of the other; (5) from each posterior superior spine to the lower edge of the symphysis; (6) from each posterior superior spine to the middle line of the back.

With the help of these measurements and of a careful examination under anæsthesia at the thirty-fifth or thirty-sixth week, an idea of the possibilities of the case must be obtained and the treatment planned on the same lines as those for the commoner forms of contracted pelvis. The only special points will be to remember the special use of version in these cases, which has been already mentioned, and that if division of the pelvic girdle is decided upon, ischio-pubiotomy on the narrow side of the pelvis will probably be more satisfactory than hebosteotomy. Jardine, however, is opposed to the use of version in the treatment of oblique pelvis.

Exostoses of the Pelvic Bones sometimes narrow the capacity of the true pelvis. This condition requires more careful treatment than simple contraction, since the soft parts of the mother are easily lacerated between the head of the child and the projecting parts of the exostosis. For this reason, in most cases, Cæsarean section will be necessary.

DIET IN THE TREATMENT OF CONTRACTED PELVIS.

The problem of the treatment of contracted pelvis has also been attacked in quite a different way from any which has so far been mentioned. The idea has been to influence the size of the foetus and the ossification of the foetal head by regulating the diet of the mother during pregnancy. Prochownik has been the chief worker in this field. He withholds both fluids and carbohydrates except in the smallest quantities, and his results may be summarised as follow: The mothers bore the diet well, though with some discomfort at first, especially thirst and distaste for so much animal food, but both these troubles were lessened by a liberal allowance of green vegetables. The labours were easier than previous ones had been. All the children were born alive and, so far as is known, survived. The children were usually lean when born and their cranial bones were very movable upon each other. The children gained weight normally after birth. Lactation was not influenced unfavourably. This diet is only to be adopted during the last six weeks of gestation, and is as follows:

Breakfast.—A small cup of black coffee (3·38 oz.); bread with a little butter (4 or 5 oz.).

Luncheon.—Meat or fish, eggs, green vegetables, salad, cheese.

Dinner.—Same as luncheon, with the addition of bread and butter (1½ oz.).

Absolutely forbidden.—Water, soup, potatoes, farinaceous food, sugar, beer.

Fluids allowed.—10 to 14 oz. red or Moselle wine a day.

As soon as labour has taken place, this special diet is stopped and non-nitrogenous food is given freely.

The only objection to Prochownik's diet appears to be that it seems likely to favour eclampsia, so that in cases where it is being taken the patient's urine should be tested for albumin at regular weekly intervals, and a close watch kept for any of the other premonitory symptoms of eclampsia.

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DEFORMITIES AND DISEASES OF THE FÆTUS CAUSING OBSTRUCTION TO LABOUR.

OBSTRUCTION to labour entirely fœtal in origin is, with the exception of the condition known as post-maturity of the fœtus, comparatively rare.

As the size and condition of fœtal parts can only be estimated very roughly from external examination, cases are not recognised until labour has commenced, unless there has been a previous history of a difficult confinement.

In considering these cases, they are best divided into :

- (1) General Enlargement of the Fœtus.
- (2) Local Enlargements of the Fœtus.

GENERAL ENLARGEMENTS.

General Enlargement may be due to either

- (1) A condition of post-maturity ; that is, the fœtus, instead of being delivered at the fortieth week of pregnancy, is carried *in utero* until the forty-fourth or forty-eighth week ; or
- (2) The child of normal parents is much larger at term than is usual, a condition for which no actual cause is known.

It is usually easy to recognise these two conditions after birth. In the post-mature child the ossification of the bones is further advanced, this being most evident in the skull ; the fontanelles are much smaller, the bones firmer, and the sutures more closed than those of a child born at the fortieth week ; whereas in the second condition the fontanelles and skull bones are in the same state as in an ordinary full-term child.

Another minor point is that the vernix caseosa increases in amount with the length of time of the fœtus in the uterus.

Post-maturity.—This condition is seldom met with in primiparæ, there being generally a history of one or two normal labours ; and then the third or fourth pregnancy is carried on beyond the expected time, with marked difficulty in the labour.

The trouble is most frequently found to be with the head. Owing to the increased ossification of the bones, moulding (which is of such valuable assistance in delivery) is to a great extent prevented.

The treatment, which is similar to that of delivery in a case of

generally contracted pelvis, depends on whether the patient is seen (a) during labour; (b) in the later months of pregnancy.

(a) *During the first stage of labour* the mother's strength must be kept up by plenty of liquid food, and if the pains appear to be tiring her very much, chloral (gr. 40 by the mouth, or ʒj by rectum), or inj. morph. hypoderm. (ʒ5) [U.S.P., morphinæ tartratis, gr. ʒ] scopolamine (gr. $\frac{1}{100}$), should be given.

During the second stage, the main points are to allow labour to go on as long as possible, if of course without detriment to the mother or child, so that the uterus may mould the head into the pelvic brim as far as possible, or even complete the delivery.

A careful watch must be kept on both the maternal and fœtal pulses; as long as these remain good labour should be allowed to continue, but when either begins to fail, delivery is indicated. If the head has engaged in the pelvic brim, axis-traction forceps should be used. Traction should not be applied for more than two or three minutes at a time, and if possible with the pains, care being taken to screw up the lock only whilst force is being applied and to loosen it in the intervals, thus preventing too prolonged pressure on the child's head. It is not advisable to take off the forceps when the largest circumference of the head is past the brim of the pelvis, as one sometimes does when delivering through a simple flattened pelvis, because the size of the head will also cause obstruction in the cavity of the pelvis.

If the head has not engaged and the child is alive, Cæsarean section should be performed; but if the child is dead, the head should be perforated, and delivery completed with a cephalotribe or craniotomy forceps.

In the case of a breech presentation with the membranes unruptured, version by the bi-polar or external method must be attempted, but will in many cases be found impossible.

Then, labour having been allowed to continue naturally until the legs and breech are born, a vaginal examination should be made to see whether the arms are extended, and if so, they should be brought down.

It is most important that an assistant should now bring firm pressure to bear on the head from above, and the operator, with the first two fingers of his left hand in the child's mouth to keep the head flexed, places his right hand on the child's shoulders so that the head is between the index and middle fingers, and brings traction to bear in the axis of the pelvis; that is, at first backwards, and then, as the head descends into the pelvic cavity, gradually forwards.

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If this fails, axis-traction forceps should be tried, the child's body being held well forwards while they are being applied, and if the forceps fail, perforation through the roof of the mouth or through the occipital bone must be done.

(b) In the later months of pregnancy.

If, from the history of the previous labour, there appears to be a likelihood of difficulty in delivery, the patient should be examined weekly from the thirty-eighth week onwards, and the size of the fetal head in comparison with the pelvic brim made out. Two points may be made use of in doing this: firstly, with the patient lying flat on her back, the fetal head should be pressed downwards on to the promontory of the sacrum, and any projection over the symphysis pubis noted; secondly, with the patient's back well propped up, the head should be pressed downwards and backwards into the brim of the pelvis. When one cannot just press the head into the pelvis or there seems to be a marked projection over the symphysis pubis, labour should be induced, either by means of bougies or the small hydrostatic bags made for the purpose.

In passing a bougie it is advisable to have the patient on her left side with her knees drawn up; then the bougie, having been previously sterilised by soaking in 1 in 500 perchloride of mercury for some hours, and the first two fingers of the left hand passed into the vagina up to the cervix, is run up in the groove between the fingers to the cervical canal and guided into the external os; by delicate pressure it is now gradually passed up between the membranes and the uterine wall, usually tending to go up the posterior wall, but it makes no difference whether it goes up in front or behind. If the cervical canal is so small that difficulty is experienced in guiding the point of the bougie in, it is best to pull the cervix down with a volsellum, and thus obtain a good view of the orifice.

(2) Abnormally Large Child.—Usually in these cases not so much difficulty is experienced with the head as with the shoulders, the latter tending to become impacted in the pelvic cavity. If the difficulty is with the head, the treatment mentioned in the previous paragraphs may be carried out.

If the difficulty is with the shoulders, a finger should be hooked into the anterior axilla, and, with firm pressure from above, traction made. This failing, cleidotomy (cutting through the clavicles with a pair of heavy scissors) must be performed, and in some cases it has been found impossible to deliver even after this manœuvre, and it has been necessary to remove one or both arms by cutting through the shoulder-joint.

LOCAL ENLARGEMENTS.

Local Enlargements of the Fœtus causing difficulty in delivery are so exceedingly rare that one is seldom on the look-out for them. Consequently, when any unusual difficulty is experienced in the delivery of a woman, it is absolutely essential that a careful examination, under an anæsthetic if necessary, be made and the cause of the obstruction diagnosed. By this means one avoids making repeated attempts at delivery, which may do severe harm to the mother and child, when some comparatively simple manœuvre may completely overcome this difficulty.

These enlargements may be divided into (1) those of the head and neck, and (2) those of the trunk.

Hydrocephalus.—Where the head presents, the diagnosis may be made either by the facts that the presenting part fails to engage, and on abdominal examination the head is felt to be very large and rather soft; or, as happens in many cases, the presenting part is low down in the pelvic cavity and yet labour is obstructed, and on abdominal examination the greater part of the head is felt above the brim. In these latter cases, on vaginal examination, one is liable to mistake the soft and somewhat cystic head for the unruptured membranes.

The treatment in these cases is perforation, thus allowing the fluid to escape, when labour is usually completed naturally; if this is not the case, the head may be delivered with craniotomy forceps.

If it were very essential that a live child be born, aspiration of the fluid with a trocar and cannula might be attempted. But in the cases where the hydrocephalus is sufficient to cause obstruction to delivery, the possibility of getting a live child is very small, and even if one did, death would probably occur in a few days.

When the breech presents, on abdominal examination the presence of the very large head at the fundus of the uterus is easily made out. No obstruction occurs in the delivery of the trunk, but then it is found impossible to deliver the after-coming head. The treatment here is either perforation through the roof of the mouth or through the occipital bone or aspiration of the fluid.

In perforation of the after-coming head through the occipital bone, the body of the child should be drawn back as far as possible, and held in that position by an assistant (this is assuming that the occiput is to the front). Then the first two fingers of the left hand should be passed up to the occiput, and the perforator guided along them until the points are on the bone, when one or two short stabs will be sufficient to penetrate. The perforator is then opened,

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closed, turned through a right angle and the movements repeated, and it is withdrawn. The fluid will flow out freely, and traction on the body will be found sufficient to deliver the child.

Encephalocele.—This condition rarely obstructs delivery. If it should do so, the sac could be easily tapped with a trocar and cannula.

Anencephalus.—Owing to the small size of the head in some cases, the dilatation of the soft parts by it is not sufficient to allow the shoulders to be delivered immediately; but as there is no need to consider the life of the child, it is best to allow the woman to deliver herself, that is, by further pains to dilate the soft parts sufficiently to allow the shoulders and trunk to be born.

Cystic Hygroma and Congenital Cystic Goltre.—These conditions are exceedingly rare, and can only be diagnosed by passing the hand into the vagina and making a careful examination.

The treatment consists in puncture with a long trocar, care being taken not to wound any of the big vessels in the neck.

Conditions of the trunk which give rise to dystocia are practically always associated with the genito-urinary apparatus.

Imperforate Urethra.—This causes distension of the bladder and hydronephrosis, and the abdominal tumour formed thereby may be sufficient to cause obstruction. These cases nearly always present by the vertex, and there is no obstruction until the head is born; then it is found impossible to deliver the trunk. When this occurs, the hand should be passed right up into the uterus and the cause of obstruction made out; and then, if the child is alive, puncture should be made just below the umbilicus with a long fine trocar, carefully guided in on the point of the finger; or, if the child is dead, the abdomen should be opened with a pair of scissors or a perforator and delivery completed.

Congenital Cystic Disease of the Kidney.—Here the diagnosis is made in a similar way to the preceding. Puncture of the tumour should first be tried; but as it is usually made up of a large number of very small cysts, the fluid will not flow easily, in which case evisceration must be performed.

Monstrosities.—Practically the only ones that give rise to trouble are the double monsters. The greatest difficulty is experienced with those in which two heads are present with the trunks completely fused, or in which there are two separate trunks only joined by a band.

This condition is never diagnosed until labour has commenced, and then only when some difficulty in delivery occurs.

The principles of treatment are: Make a careful examination by

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passing the whole hand into the uterus. If delivery seems possible by decapitating one fœtus, or in those cases where they are joined by a band which can be divided, by division of that band, one of these methods should be carried out. But if there seems to be a likelihood of severe damage to the parturient canal in the course of delivery, Cæsarean section is indicated.

JAMES WYATT.

INVERSION OF THE UTERUS.

THIS is a condition of partial or complete turning inside out of the uterus. It may take place before or after the delivery of the child.

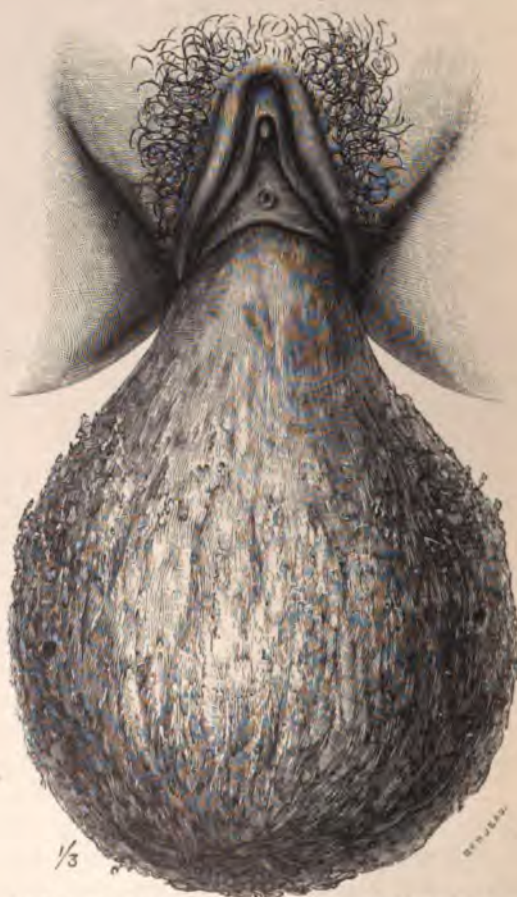


FIG. 1.—Inversion of the uterus and vagina. The dark spot on each side indicates the orifice of the Fallopian tube. (Museum of Middlesex Hospital.) By permission of Messrs. Bland Sutton and Giles.

placenta. It is one of the rarest complications of parturition, occurring in 1 in 200,000 labours. It generally begins as a

depression felt at the fundus, but three degrees of inversion are described. In the first the placental site bulges more or less into the uterine cavity; in the second the fundus uteri reaches as far as the external os or projects through it into the vaginal canal; in the third the fundus is at the vulva and may protrude through it, when inversion is said to be complete (Figs. 1 and 2). It is very probable

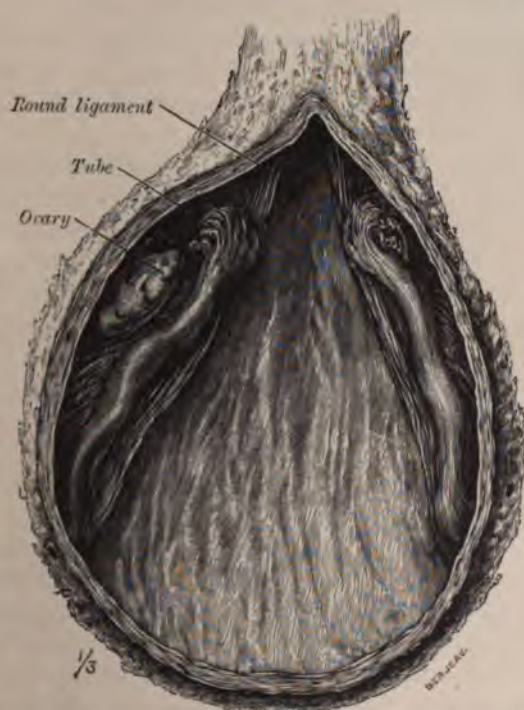


FIG. 2.—The inverted uterus represented in preceding figure, opened from behind. By permission of Messrs. Bland Sutton and Giles.

that the process always begins during the third stage, although it may not be recognised until after delivery of the placenta. Inversion of the uterus is most common in primiparæ, and is said to be due to paralysis of the placental site. It may occur spontaneously or may be caused by injudicious means in the delivery of the placenta, such as too vigorous compression of the fundus or traction on the umbilical cord. As regards spontaneous inversion it is claimed that during uterine atony the patient may invert her own uterus by bearing-down efforts; at any rate, the first degree, *i.e.*, a slight depression of the fundus, may be started in this way and

then the process may be increased by the active part of the uterus contracting upon the inversion and driving it downwards towards the cervix in much the same way as an intussusception of the bowel is produced. It is far more likely, however, that inversion is produced by mismanagement more often than spontaneously, and rare as it is, it is better to consider inversion to be to a large extent avoidable. Precipitate labour is made to account for some cases, and there is danger of inversion occurring when the child is expelled whilst the patient is standing, especially if the cord is relatively shortened by being twisted around the child's neck or body. Inversion is produced rapidly but may proceed slowly, taking several days for its completion.

There is another cause quite apart from the obstetric conditions above mentioned, which may produce inversion, viz., growths in the uterine wall; these, however, will be dealt with elsewhere.

The symptoms of this condition are three: Acute pain, hæmorrhage, and shock; the physical signs are loss of the fundus on palpation through the abdominal wall and the presence of a cup-shaped structure lying in the vagina or presenting at or through the vulva. The bleeding may be profuse or slight, whilst the presence of shock is diagnosed from a rapid, thready pulse, cold clammy skin, pallor, and nausea, or even vomiting and faintness. The condition may, however, occur without any of these symptoms (partial).

In those cases where the hæmorrhage is slight the placental attachment is intact, and if pain and shock are not experienced the condition is only partial, and if it proceeds will do so gradually (chronic inversion). Such a state of **partial inversion** tends to undergo spontaneous readjustment as soon as the uterus recovers its tone; it is therefore quite possible that the first stage of inversion passes unnoticed by the accoucheur or midwife, and that it is far commoner than statistics lead us to believe; diagnosis should include not only the discernment of the complete inversion but also that of the partial. In either case the diagnosis is not difficult, for, as already stated, partial inversion is detected by a depression at the fundus or placental site, the latter, in cases of inversion, being always found to correspond with the fundus (polar attachment); if a gloved hand is introduced into the cavity, the convexity of the depression will be felt bulging into it.

The treatment of **partial inversion** is simple and should be carried out as soon as it is discovered. After clearing out any clots or possible pieces of placenta, steady pressure is made upon the **convex** surface within the uterine cavity; at the same time **counter-pressure**

is maintained on the uterus externally through the abdominal wall, until the normal shape of the uterus is restored.

In complete inversion we have a condition which may be met with in an acute or chronic stage, whilst it will be gathered from what has previously been said that there can be no chronic stage to partial inversion of the first degree, since at this stage the inverted area will either restore itself spontaneously or will progress by intussusception into the second or third degrees.

The diagnosis of complete inversion in the acute stage is not difficult. The internal surface of the uterus will present itself in the vagina or at the vulva as a bright red sensitive contractile mass, which on digital examination can be felt to project through the cervix, whilst the latter maintains its normal position and does not share in the inversion. The placenta itself is sometimes still adherent to the summit of the mass or to one or other of its walls. The openings of the Fallopian tubes may be detected on either side of it. The fundus uteri is missing above the pubes, and on rectal examination the uterus will be found to be absent from its normal position. The tumour outside the vulva is at first contractile. The cervix at first is soft in consistence; between it and the projecting mass a sound may be passed upwards for a short distance only, there being generally about $\frac{1}{2}$ inch of cervix in the non-inverted state forming a collar to the inverted lower segment. If restoration is not immediately and successfully performed, the cervix may contract and become œdematous, forming thereby a constricting collar or band around the projecting mass. The latter then suffers from the pressure thus produced, and signs of strangulation begin to show themselves by a change in colour, by cessation of hæmorrhage, or the general oozing which proceeds from the mass whilst the cervix remains soft, and finally sloughing may follow. During such changes as these the patient's general condition will become more and more serious, and it is estimated that the mortality is as high as 50 per cent. Death is due either to hæmorrhage or shock, and may occur within half an hour of the accident. Another possibility is incarceration of a loop of intestine within the inverted cup of the uterus. Gangrene of the protruding mass with general peritonitis and acute toxæmia on occasions play a part in adding to the mortality.

It will be seen that acute puerperal inversion is a very serious lesion, and also that in the majority of cases it is due to preventable causes. Precipitate labour should be prevented. Credé's expulsion should not be attempted in the absence of a contraction, and undue force in carrying it out should be guarded against. On no account

should traction on the cord be made. Relative shortening of the cord (*i.e.*, when it is twisted round the neck of the fœtus) should be detected early and the twist released. So much for prophylaxis.

The curative treatment consists in the administration of an anæsthetic and the immediate reduction of the tumour under its influence. The bladder and rectum must be emptied and reduction carried out by means of taxis. Reduction is commenced by returning the part nearest to the cervix, the fundus being the last part to reduce. Under anæsthesia one hand is placed upon the abdomen, and the fingers are made to enter the cervix from above, in order to assist in dilating and steadying it whilst the fingers in the vagina are proceeding with the reduction. This will succeed if carried out before the cervical ring has become contracted, success depending entirely upon early interference. In fact it has been



FIG. 3.—Champetier de Ribes' bag.

advised to spend no time in separating an adherent placenta, but rather attempt to return it with the reinversion of the fundus, but if the placenta interferes with the reduction it should certainly be stripped off. Reduction should be followed by an intra-uterine douche administered at 115° F. to assist contraction and to act as a disinfectant.

Some authorities advise the employment of gauze plugging for the uterine cavity to prevent a recurrence, but the best means to effect this end is to continuously massage the uterus and to give a large dose of ergot. When the body of the uterus has become swollen, it will need to be bandaged or to be manually compressed before reduction, whilst for the relaxation of the os there is nothing better than chloroform anæsthesia.

Should reduction fail, or should the attempt be attended by dangerous shock to the patient, hæmorrhage if present, can be checked by ergot and local astringents, whilst finally Champetier

de Ribes' bag may be used in the vagina to keep up continuous pressure, strict antiseptic precautions being employed and the bag being distended with air. After the bag has been left *in situ* for twenty-four hours another attempt at reduction should be made and the child should be put to the breast. Several cases are recorded in which de Ribes' bag (Fig. 3) has alone produced re-inversion.

Complete Chronic Inversion.—For the treatment of this condition *see* Displacements of the Uterus.

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LACERATIONS OF THE GENITAL TRACT.

A CERTAIN amount of laceration of the genital tract during process of labour is inevitable. Unavoidable tears in the cervix and at the vaginal outlet occur in every primipara during



FIG. 1.—Clover's crutch.

act of parturition. The act of coitus usually produces lacerations of varying degree in the virgin hymen. In the majority of cases these lesions are slight and necessitate no surgical interference, healing occurring spontaneously. Deep lacerations are the result of violence; hence in the case of hymeneal tears, forcible penetration such as happens in rape is much more likely to lead to deep laceration and free hæmorrhage than when the woman is acquiescent. When the bleeding is free enough to cause alarm to the patient, the treatment consists in plugging the introitus of the vagina with sterile absorbent gauze soaked in adrenalin solu-

(1 in 1,000); in some instances it is necessary to catch the bleeding points with artery forceps and tie them off with fine catgut, and in the case of a married woman to insert a vaginal rest for a week to secure dilatation before coitus is again attempted.

Severe Lacerations of the Cervix are produced by dragging the foetus through an imperfectly dilated os; prophylactic treatment consists in using the utmost care in turning and in the application of forceps. As precipitate labour produced by very strong pains and bearing-down efforts in the second stage is accountable at times for deep laceration of the cervix, the patient should be told not to bear down when the pains are strong, and she should be kept recumbent after the os is three parts dilated in order to preserve the membranes as long as possible. A fully dilated os is not likely to be badly lacerated.

The treatment of a severe tear in the cervix consists in arresting the hæmorrhage and closing the wound by a series of fishing-gut



FIG. 2.—Toothed dissecting forceps.

sutures. After expulsion of the placenta the patient is placed under anæsthesia, a Clover's crutch (Fig. 1) is applied below both knees; its strap is placed under one shoulder and over the other, and with it the legs are separated and drawn up. The vulva is cleansed and the clots cleared out of the vagina. The perineum is depressed by a rectangular speculum and the cervix drawn down into view.

The edges of the tear are then clearly defined, their two extremities seized by toothed forceps (Fig. 2), and the sutures of fishing-gut are passed through the entire thickness of each flap of the torn cervix; each interrupted stitch should be passed in and drawn out at least $\frac{1}{4}$ inch from the edge of the wound, and the stitches must be drawn together tight enough to arrest hæmorrhage, but not tight enough to cut through the softened cervix. The suturing is begun from above, the first stitch passing through the angle of the tear. If careful apposition is obtained, the last stitch will re-establish the proper contour of the external os. The silkworm-gut is left long, the lengths being tied together in a knot and left hanging in the vagina. The fornices of the vagina

are firmly packed with bismuth gauze, which is removed in twenty-four hours, and the following mixture is given by mouth: Ext. Ergotæ Liq., ʒss; Acid. Sulph. Dil., ℥15; Magnesii Sulph., gr. 20; Aquam Cinnamomi, ad ʒj. This mixture, given twice daily, aids involution of the uterus. The sutures are removed on the eighth day after insertion. This small operation does not need an anæsthetic.

The above method succeeds very well for tears of the cervix which are limited by the vaginal vault. When laceration extends higher up than the fornices so as to include the attached portion of the cervix and perhaps a part of the lower uterine segment, accurate suturing per vaginam is almost impossible. In a case of this kind which was admitted into the Charing Cross Hospital the writer succeeded in getting a good result by packing the rent tightly with gauze after cleansing out all the clots and disinfecting



FIG. 3.—Volsellum.

the torn area. Fresh packings were inserted daily, in amount varying with the contraction of the wound, and final suturing of the vaginal cervix was left for a later date.

Secondary closure of a cervical tear is necessary in order to prevent ectropion, cervical catarrh, subinvolution of the uterus and abortion. The time chosen for this operation should be just after or within a week of the menstrual epoch, and after the woman has finished nursing. The patient should be given 1 oz. of castor oil on the previous night, and an enema of soap and water should be administered on the morning of the operation. The vagina should be douched with a 1 in 2,000 biniodide of mercury solution for a few days prior to the operation. The patient should take a bath, and the vulva should be shaved completely overnight and be washed with ether soap, as also should the vagina after the patient is under the anæsthetic. Finally, the skin of the vulva is swabbed with a spirituous solution of biniodide of mercury

(1 in 1,000). The operator's hands should be scrubbed in soap and water and then immersed in methylated spirit and water (equal parts). He then puts on a pair of boiled rubber gloves. The application of gloves is much aided by filling them with lysol solution (5j to the quart). This is a slippery soapy fluid which does not cause the gloves to stick to the skin as a spirituous solution is apt to do. After the vagina has been swabbed out with a 1 in 2,000



FIG. 4.

biniodide of mercury solution, the cervix is drawn down with a volsellum (Fig. 3), the perineum is depressed by an Auvars' weighted speculum, and the side of the vagina towards the tear is retracted by a rectangular speculum. Any excess of mucus on the cervix is mopped away by a solution of bicarbonate of soda. It will be found that the skin edges of the tear are inverted and need to be freshened. This is done by drawing down and steadying the cervix, whilst a knife resembling the Paget's blade on a long handle (Fig. 4), but somewhat narrower, is

inserted into the cervix just above the angle of the tear. It is introduced on the flat, and by a to-and-fro movement is passed parallel to the edge of the laceration, until it emerges at the free



FIG. 5.

extremity which originally formed part of the circumference of the external os. This produces a flat freshly cut surface and removes the ingrowing skin. Another method is to mark out the flaps for removal by a knife and employ scissors for the actual dissection (*see* Fig. 5). The procedure is carried out on both sides of the tear, which is then ready for the sutures of apposition. These are inserted by means of a fine pedicle needle (Fig. 6); silkworm-gut is used and a long pair of toothed dissecting forceps are employed to steady the edges of the wound during the passage of the sutures. The latter are passed in the manner described for primary cervical suture, *i.e.*, beginning above and working towards the os from above downwards. Interrupted sutures are employed; as the

cervix is often tough from cicatrization, an essential point is to have a sharp lanceolate needle (Fig. 6), which easily penetrates the tissues and causes the least possible damage; some operators prefer to use silver wire, which, when threaded through, is twisted tight by a wire twister. Whether wire or fishing gut is used, the stitches



FIG. 6.—Pedicle needle.

may be taken out on the seventh or eighth day, when the wound should be found to have healed completely, and the os should be of normal dimensions. It is well to pass a sound into the uterus after the stitches are applied to see that the canal is free. Gauze packing in the vagina is used as in the primary operation. If curetting is performed for menorrhagia at the same time as suturing the

cervix, strong medicated solutions should not be used for swabbing out the cavity or the canal of the cervix, as they interfere with primary union. The gauze is removed daily as long as the sutures are left *in situ*.

More than one tear may exist in the cervix at the same time, but owing to the frequency of left occipito-anterior presentations, a single tear on the left side is the commonest lesion. It is not uncommon to find the anterior lip of the cervix entirely separated from the posterior by two symmetrical tears, one on either side.



FIG. 7.

Such a condition is often associated with profuse cervical catarrh, menorrhagia and sub-involution of the uterus, and the *tout ensemble* frequently leads to repeated abortions, which, if no examination is made, are put down to syphilis. The two separated lips are generally very hypertrophic. The mucous membrane presents as a corrugated reddish surface on either lip (ectropion), and the surfaces are covered with glairy muco-pus. Two alternatives as to treatment present themselves. We may freshen the edges of both wounds and close them by means of sutures as just described, but when the uterus is bulky and heavy and tends to prolapse, the better treatment is to amputate both lips, and thus lessen the weight of the uterus and minimise the amount of descent.

Amputation of the Cervix.—The lips are drawn down by a volsellum as in the operation for repair (Fig. 7). The speculum is removed and the cervix is drawn into the vulval aperture. The position of the bladder is next defined. Its lowest limit is generally visible as a crescentic line at the junction of the smooth cervical with the rugose vaginal surface. Any doubt, however, on this point must be cleared up by the passage of a sound. A transverse semilunar incision is made immediately below the reflection of the bladder, and the knife is carried through the thickness of the cervical mucous membrane in a direction at right angles to the

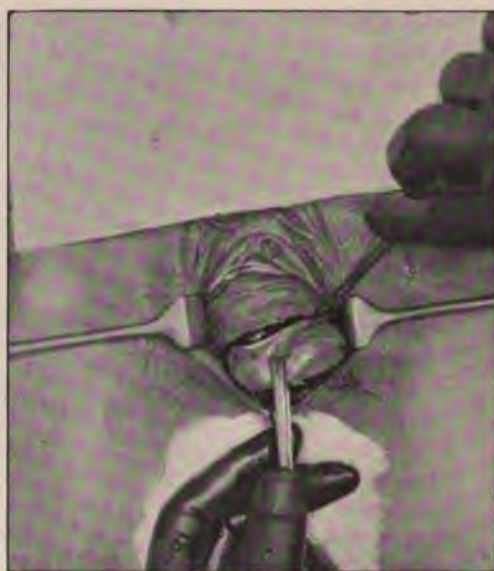


FIG. 8.

cervix (Fig. 8). Up to this point the operation is carried out just as if vaginal hysterectomy were about to be performed, but in proceeding onwards the technique of raising the bladder differs in the two cases. If the cervix is to be removed, it is important not to open the peritoneal cavity; therefore as soon as the cellular tissue is laid bare beneath the reflection of the bladder, the bladder may be raised from off the cervix by what is known as blunt dissection, *i.e.*, by graduated thumb pressure with the palmar aspect of the thumb directed upwards and the nail turned downwards towards the cervix (Fig. 9). In this way the bladder and the vesico-uterine pouch of peritoneum are both raised beyond the line through which it is desired to amputate the denuded cervix. The other method of

raising the bladder consists in "sharp dissection" of the cellular tissues, and is carried out when it is desired to open the utero-vesical pouch. The central point of the upper edge of the skin incision is drawn vertically upwards by tooth-dissecting forceps. This displays the raw surface of the bladder and puts the connective tissue uniting it to the cervix on the stretch; each vertical fibrous band is then cut through by blunt-pointed scissors curved on the flat (Fig. 10). The curve of the scissors is directed towards the cervix and the nose of the instrument is laid on the surface of the latter and the cellular tissues kept well on the stretch are



FIG. 9.

divided close to the cervix. In this way the line of separation can be accurately adhered to, no bruising of vesical tissue occurs, no vesical vessels are lacerated, and the vesico-uterine pouch is soon found within easy reach. Having raised the bladder and bared the cervix in front, the skin incision is continued around the sides and back of the portio vaginalis (Fig. 11); the latter is now drawn well forwards, and beginning in the central line the cervix is separated and laid bare by blunt (Fig. 12) or sharp dissection, similar to that employed in front, taking care not to open the pouch of Douglas. The cervix is now free in front and behind; at the sides it is held by the connective tissue and blood-vessels in the base of the broad ligament (Fig. 13), and in close

proximity to the lateral walls lie the ureters as they run forward underneath the uterine arteries to reach the bladder. The lateral wings of connective tissue have to be ligated and severed, and in order to do this with perfect safety to the ureters the writer advises that the flat blade of a rectangular or bayonet-shaped spatula be inserted between the cervix and the bladder and the latter pulled well up out of the way. The assistant holds the spatula and makes the necessary retraction; he also draws down the cervix by a volsellum, and the operator now proceeds to pass the lateral



FIG. 10.

ligature. The thumb and index finger of the left hand are used to define the tissues which are to be tied; on the right side the finger passes in front and the thumb behind the cervix, and the thickness of the lateral connective tissue is estimated; the angle of tissue between the cervix and broad ligament attachment is compressed by the finger and thumb to make sure of the absence of ureter and also of a corner of the bladder, which in cases of prolapse is very prone to hang down at the sides, where it may remain even after the viscus has been raised in front by dissection. Guided by the left index finger, a blunt pedicle needle armed with a ligature of No. 4 Chinese silk is passed close to the cervix from before

backwards, whilst on the left side the thumb of the operator's left hand is placed in front and the index finger behind the broad ligament, and the threaded needle passed inside the thumb between it and the cervix and close to the latter. After tying one twist of the knot the tissues in its grasp should be divided, and then the twist tightened again before the reef knot is completed. In using the scissors the cut should be made with the nose pressed against the cervix, and the tissues are divided accurately at right angles to



FIG. 11.

the direction of their fibres and not obliquely, or the ligature will slip and the tissue recede beyond the knot (Fig. 14).

Two, and sometimes three, ligatures are required on each side; they will include branches of the uterine artery, but not the main trunk. After the supravaginal portion of the cervix has been laid bare all round (Fig. 15), the amputation of each lip is separately carried out, beginning first with the anterior lip. Straight scissors are introduced into the lateral tear, and the cylindrical upper part of the cervix is split up laterally in the lines of the original lacerations (Fig. 16). This division is carried as high as the line through which it is decided to amputate. The cervix is in this way split into anterior and posterior halves, awaiting division front and back. If the cervix is bulky, each flap is cut off by a V-shaped

incision (Fig. 17, sound in canal), the dorsal cut passing halfway through the flap, where it is joined by another cut passing upwards to meet it from the mucous surface. The posterior flap is removed in the same way, and whilst this is being done the anterior half of the stump is secured and fixed by a volsellum. The stump now presents two transverse wedge-shaped cavities, one above the os and one below; these are next closed by buried catgut sutures, one on each side of the cervix and four in all (Fig. 18). The bulk of the amputation stump is then considerably diminished, and its closure



FIG. 12.

is next proceeded with. First, the lateral silk ligatures used to tie off the broad ligaments are cut short as soon as it is seen that all oozing has ceased. The retractor holding up the bladder is withdrawn, the free edge of vaginal skin is found and brought over the stump; it is then united to the margin of the cervical canal by interrupted silkworm-gut sutures. These stitches require some care in their application, if a presentable stump is to result. The central ones, back and front, should be passed first and tied, but not cut off. (Fig. 19). Traction on these stitches in the mid-line will produce a transverse linear wound, and the operator can then judge how much vaginal tissue is required to cover the stump laterally; generally

speaking, six sutures are necessary, three in front and three behind, and when these are applied, the broad ligament stumps still require to be covered; this is done by one or two catgut stitches on either side (*see* Fig. 19). For the six stitches which penetrate cervical tissue it is well to use a Hagedorn's needle with a sharp curve (Fig. 20); the needle is passed through the vaginal tissue first and then through the cervix, and each stitch is brought out at the edge of the cervical canal, so that all the stitches radiate towards the new os. The strands of fishing-gut are left long and



FIG. 13.

tied together. The vaginal vault is packed with bismuth gauze, which is removed after twenty-four hours. The stitches are removed on the eighth day, which can be done without an anæsthetic. Primary union in this and the foregoing operation depends upon perfect hæmostasis and asepsis; unless all bleeding is checked and the wound is dry, a hæmatoma will form between the bladder and the stump, whilst at the sides an infected buried silk will result in cellulitis and abscess formation, but there is not the slightest need for either of these accidents to occur.

The Removal of Sutures from the Cervix.—Fishing-gut tends to bury itself, and it is not always easy to find the knots. If knots are

not found and seen, they will be left behind. The perineum must be retracted, one strand belonging to each knot is pulled on, and if the latter does not come into view a small sharp hook (Fig. 21), such as that used for drawing down the ovaries and tubes through a colpotomy wound, should be used to find it. The hook is passed parallel to the ligature into the groove in the tissues in which the knot lies, and when right home it is turned through a right angle and then drawn out. It will bring the loop of fishing-gut with it; any part of the loop beneath the knot may be cut, but, strong as the



FIG. 14.

temptation may be to cut the strands of a ligature off and leave the knotted loop behind, this should never be done; it will most certainly give rise to trouble, and the patient will complain of it pricking her.

So far only a unilateral or bilateral symmetrical laceration of the cervix have been mentioned, but the portio vaginalis may be also torn back and front, producing three, or even four segments. Such multiple lesions are due to the introduction of forceps through an imperfectly dilated os, or to *accouchement forcé* for rapid delivery in eclampsia or ante-partum hæmorrhage. Want of care in performing internal version leads to the same result. It is generally

more satisfactory to amputate than to try to repair each laceration, when so much damage has been done.

Laceration of the Vagina.—The vagina may be lacerated in its upper, middle, or lower thirds; the last is the most common, the middle the rarest part to be torn, but the writer has twice had to treat patients for tears extending throughout the whole length of the canal, and in one instance the rupture was associated with extra-peritoneal laceration of the lower uterine segment; indeed, such extensive lacerations of the vagina are clinically related to



FIG. 15.

rupture of the uterus, the causes of each being practically the same.

These terrible injuries are produced by the injudicious use of forceps in obstructed labour. They require careful cleansing and the clearance of blood clots, and finally the wounds must be firmly packed with sterile bismuth gauze, in order to check hæmorrhage.

Ruptures of the upper third of the vagina are usually transverse in direction; they may be the extensions of cervical lacerations, or may occur independently. In delivery through a funnel-shaped pelvis the vagina may become impacted between the head and the bony ring, and be torn right across, or it may be completely

separated by the longitudinal stretching produced by drawing up of the vagina over the presenting part. The introduction of the hand in the performance of version has been known to tear the vagina transversely.

Such lesions should be treated on the lines of post-partum hæmorrhage, *i.e.*, the bleeding must be stopped, and to do this careful primary suture is necessary. If the practitioner is single-handed and cannot get an assistant and an anæsthetist, the only thing to be done is to firmly pack the rent, fill the vagina with



FIG. 16.

gauze and send the patient into hospital. In delay during the second stage with a narrow conjugata vera, contusion of the anterior wall of the cervix, vagina and base of the bladder may occur and lead to fistula, either vesico-vaginal or even vesico-uterine.

Many such lesions will heal spontaneously or with the aid of daily touching up with nitrate of silver. In other cases permanent fistulæ result and will require closure. If sepsis of the bladder supervenes, the sloughing may be very extensive. The writer was called to attend such a case in the Samaritan Hospital, where the base of the bladder and the anterior vaginal

wall came away as a huge slough soon after the patient's admission. As a rule, the fistulous aperture is small, and may even require injection of the bladder with milky water to make out its position and relations. The treatment consists in paring the edges clear of inverted skin (Fig. 22), separating the adjacent bladder wall very freely all round from the adherent vaginal wall (Fig. 23), closing the opening in the bladder with interrupted buried sutures of No. 2 chromicised catgut or silkworm-gut, and finally closing the vaginal tissue by fishing-gut passed at right angles to the vesical sutures

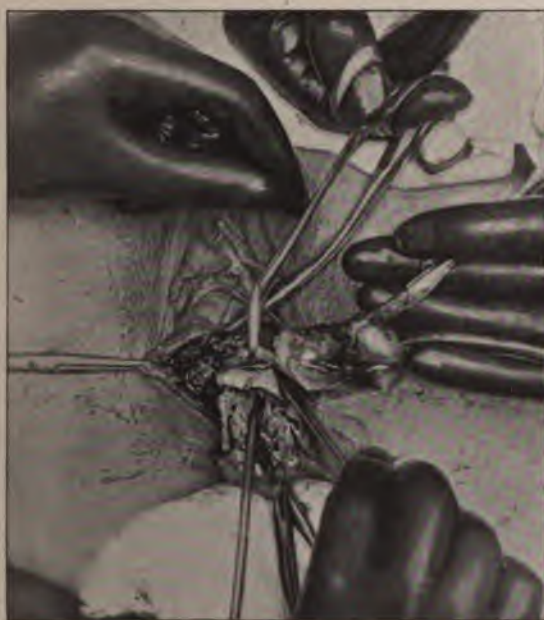


FIG. 17.

(Fig. 24). If the bladder is not freely separated from the vagina, union will not take place; a single set of sutures through vaginal and bladder walls is insufficient. A self-retaining catheter (Fig. 25) should be kept in for a few days, so that no strain is put upon the sutures by the bladder filling up with urine, and contraction in the act of micturition is avoided.

Submucous lacerations with pocketing of blood clot and lochial discharge may occur in the middle third of the vagina from distension by the presenting part of the foetus. They must be kept clean by vaginal douching and packed with absorbent sterile gauze. Severe contusions occur without definite laceration, especially on

the anterior wall of the middle third, where the vagina and bladder get nipped between the pubis and head of the child; such lesions require careful antiseptic attention or fistulæ will result. Laceration of the middle third, as already stated, is comparatively rare, but, when it occurs, the tear is generally longitudinal and not transverse, as it is in the upper third, and colporrhexis so low down never occurs.

Laceration of the Lower Third of the Vagina, Vulva and Perineum.—Tears in this position, like those in the middle third of the vagina, are generally longitudinal, but they may be vertical or



FIG. 18.

oblique. Included here are lacerations of the fourchette, the posterior commissure, the perineum, the lower third of the posterior, and lateral vaginal walls and the recto-vaginal septum. The actual tissues implicated in the varieties of lacerations will embrace, from without inwards, the skin between the anus and the posterior commissure, the vulval "mucous membrane," the vaginal walls, the rectum, cellular tissues between rectum and vagina (the perineal body), and the muscle fibres of the sphincter ani and the levatores ani.

Vulval injuries, in which no other tissues are involved, are of comparatively slight importance, and are the result of the clumsy

use of instruments, especially when vulval varicose veins are present. The writer has seen the labium minus of one side hanging like a tag, its lower half being separated by laceration. He has also seen holes made through the thickness of the labium minus. Such injuries should be closed by primary catgut suture before the anæsthetic administered during parturition has been concluded, it being remembered that all lacerations of the genitalia,



FIG. 19.

whether external or internal, afford an opportunity for septic infection.

Vulvo-vaginal cysts have been known to rupture during parturition. If the contents are purulent, the cysts should be treated like abscesses elsewhere, the walls being dissected out and the wound closed by fishing-gut, and not catgut or silk. If the contents are non-purulent, the general practitioner may close the tear with a stitch or two and leave the cyst wall for dissection later on. Tears

of the clitoris and urethra have been recorded, and although rare they are mentioned here because of the free hæmorrhage which is likely to occur in vulval laceration, which extend through the structures which lie in the anterior commissure. Primary suture is therefore necessary to check the bleeding, and this is followed by antiseptic treatment, it being remembered that such an area is

particularly prone to become infected by the pyogenic germs (strepto- and staphylococci), which are here indigenous.

Posterior abrasions and lacerations (vulvo-perineal) are the commonest lesions in obstetrics. They are commonly classified according to their extent into three degrees. In lacerations of the first degree the tear extends from the anterior margin of the fourchette for a variable distance into the perineal body; in the second degree the tear extends as far as the sphincter ani (Fig. 26); in the third degree the sphincter itself and the recto-vaginal septum are involved (Fig. 27). This classification ignores submucous and muscular ruptures where the skin and mucous membrane, owing to their elasticity, escape, but

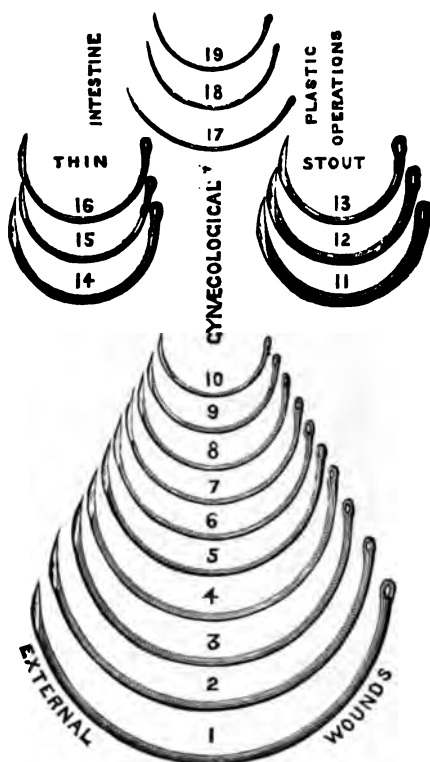


FIG. 20.

the deeper tissues, connective and muscular, suffer extensive separation or diastasis, and lead eventually to prolapse of the pelvic floor, rectocele and cystocele.

Laceration into the lower third of the vagina and pelvic floor may therefore be open or hidden, and for the open variety the above classification holds good and has the great advantage of perfect simplicity, which is a point to consider when dealing with the subject of treatment. Perineal lacerations are often simply spoken of as complete or incomplete, according to whether the rectum is torn or not. A rare form of injury produced by parturition, and

known as central laceration of the perineum, occurs, and through it the child may be born without traversing the vulva and introitus



FIG. 21.

vaginae. The tear commences above and stops short of the latter, the lowest segment of the curve of Carus not being traversed by the foetus during its expulsion; the coccyx is pushed back to the



FIG. 22.



FIG. 23.

fullest, and the head passes through a tear in the lower third of the vagina straight backwards through the perineal body, producing a laceration just short of the anal sphincter and rectum. The hymen, fossa navicularis and fourchette remain intact. The

channel thus produced needs closure by primary suture, to which the bridge of vaginal tissue between the vaginal and

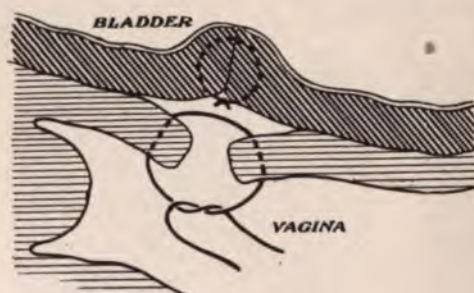
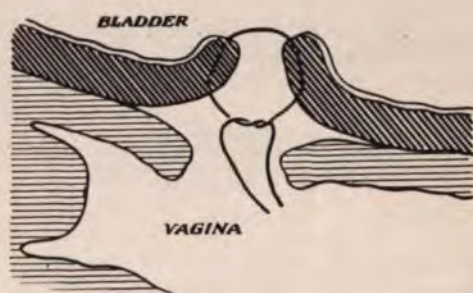


FIG. 24.

perineal apertures must be divided and the whole wound laid bare. When this has been done, it can be closed in the manner described for incomplete perineal rupture.

The Treatment of a Ruptured Perineum.—All authorities are agreed that the preservation of the perineum is of the greatest possible moment in obstetrics, and the *prophylaxis* includes a survey of the entire management and mechanism of labour, and to enter fully into this would take up more space than can be given within the confines of this article on lacerations, but a few leading points must be touched upon. In the management of the second stage it is important to delay the extension of the head until the occiput is past the subpubic arch. If extension occurs earlier than this, the occipito-frontal diameter, which measures $4\frac{1}{2}$ inches, will pass the vaginal outlet, whereas only the suboccipito-frontal should be allowed to pass, and thus $\frac{1}{2}$ inch is saved in the extending diameter. Again, if the occiput lies behind, the lie of the child should be diagnosed early enough to allow of a third or fourth vertex being turned into a first or second. In a case of persistent occipito-posterior presentation, where forceps are required and are used to deliver a face to pubes presentation, the instrument should be taken off before the bi-parietal diameter passes over the perineum. In an elderly primipara with a rigid perineum, where crowning of the head is impossible, a lateral incision on one or



FIG. 25.

both sides, made with a sharp scalpel, is better for the patient than that she should run the risk of an extensive vulvo-perineal tear of speculative extent. Due care should be exercised in the delivery of the shoulder, in making traction on an impacted breech, in bringing down extended arms and legs, in delivery of the after-coming head, in performing internal version, and in the manual extraction of the placenta. Great risk of perineal rupture occurs in delivery by forceps through a funnel-shaped (small round) pelvis, since the head recedes between each pain and cannot be made to rest upon the perineum long enough to distend it. The head should be



FIG. 26.



FIG. 27.

brought down by means of forceps and kept on the perineum by hooking a finger under the chin through the rectum. Precipitate labour is particularly dangerous to the perineum; the patient must not be allowed to bear down or to pull on a towel during the second stage, and the progress of the head must be delayed by the attendant passing his hand over the pubes between the legs, pushing back the occiput and taking the pressure off the perineum by making the nape of the child's neck hug the pubes. In every forceps operation the instruments should be removed before the head is allowed to be born. The old idea of greasing the perineum and of applying pressure through it directly to the head is useless

as a means towards its preservation. There is no doubt that the majority of perineal lacerations are preventable, and one of the dangers in a difficult case of labour is that the perineum may be forgotten in the practitioner's anxiety to terminate the labour.

It is very necessary to insist, even nowadays, on the importance of repairing a perineal laceration at the time of delivery. Even tears of less than one inch in depth, involving only the fourchette and the anterior part of the perineal body, are liable to cause sepsis, and subsequently lead to relaxation of the vaginal outlet and prolapse of the vaginal walls. *Tears of the first degree* are often overlooked, for the simple reason that many practitioners do not open up the vulval outlet with finger and thumb and examine the fossa navicularis. A small triangular tear of $\frac{1}{2}$ inch in depth passes unobserved, unless this precaution is taken. The accoucheur's first duty after the expulsion of the child is thus to separate the lips of the vulva and make sure that a tear of the first degree does not exist. If one is found, it should be sutured with No. 4 chromicised catgut, whilst the patient is still under anæsthesia and before the expulsion of the placenta. The stitches should be left untied until after the placenta has come away. The insertion of the sutures in slight lacerations is a very easy matter; they are passed from side to side and should be buried in the connective tissues at the base of the wound to prevent a hollow space being left at the bottom, and in order to include all the tissue in the depth of the wound. If this is done, no hæmorrhage can occur and the wound heals by first intention.

In *tears of the second degree* the whole perineal body is involved. In the lower angle of the wound the fibres of the sphincter ani are seen, whilst the tear runs usually upwards and outwards laterally into one or other sulcus of the vagina, and sometimes it bifurcates and one limb of the rent passes to the left sulcus of the vagina and the other to the right, producing a triangular or Y-shaped raw surface with the horns of the Y pointing upwards, a central tongue of vaginal "mucous membrane" hanging down in the middle of the Y. To repair a wound of the second degree, such as that just described, where the tear extends up the vagina, it is essential that the operator should command a full view of the wound. The patient should be placed in the lithotomy position at the edge of the bed.

A sharp needle with a wide-sweeping curve is used in the needle holder. The repair, as in the former case, of wounds of the first degree should be carried out, whilst awaiting the birth of the placenta. Silkworm-gut is the best suture for the deeper lacerations,

as catgut may be too readily absorbed. Good stout strands of gut should be chosen, the stitches should be placed $\frac{1}{4}$ inch apart, and should be inserted and emerge at a considerable distance from the edge of the wounds, for these wounds are apt to become œdematous after suturing, and then there is a tendency for the gut to cut its way out, an accident which cannot happen if they include a good margin of skin in their grasp. To secure accurate apposition it is necessary for a pair of toothed forceps (Kocher's) to be first applied to the central tongue of vaginal "mucous membrane" between the two limbs of the Y. These forceps may be held by an assistant, or, failing help, may be left hanging as a guide. The two upper limbs of the Y-shaped tear are then sutured separately; one is generally longer than the other, but the forceps are a good guide to the central point. As soon as the vaginal tear is sewn up, the lower perineal portion is dealt with. It is best now to begin from below and work upwards; the last perineal suture is inserted close to where the three limbs of the Y meet, and in passing the needle it can be used to include the angles made by all three limbs, and thus accurate apposition is secured and retraction of the vaginal portion of the tear from the perineal part is prevented, and no sulcus can form. As each silkworm-gut stitch is applied it is clamped by a pair of artery forceps, which at the conclusion of the operation are removed; the long strands of gut are twisted together and tied into a knot. Any defect in accurate skin apposition is remedied by a stitch or two of fine catgut. The wound is kept as dry as possible. Passage of the catheter is unnecessary, if the wound is cleansed after each act of micturition by careful swabbing with perchloride of mercury solution and dusting with xeroform. A gauze dressing is applied and changed when contaminated with lochial discharge and before the passage of urine and feces. The stitches are removed after eight days and the wound should heal *per primam*. It is unnecessary to bind the legs of a patient for perineal wounds of the first and second degrees, and the bowels should be opened daily.

In *tears of the third degree* the perineal body is completely lacerated together with the sphincter ani and the anterior rectal wall (Fig. 25); a cloaca or opening common to vagina and rectum is produced. In this way a more or less H-shaped wound is present, the upper limbs, as before, extending up the lower third of the vagina and the lower horns being formed by the retraction of the rectal and anal mucosa. Such grave lacerations are fortunately uncommon, and cannot occur in spontaneous labour if the expulsion of the head is properly managed. Hasty

operative delivery is the cause of such ruptures, and hence it may happen that the patient is too exhausted to be submitted to the further effects of primary suture as has been recommended, and indeed urged, in the case of tears of the first and second portions.

Authorities therefore differ in their advice as to whether a practitioner should or should not attempt to repair a complete rupture of the perineum at the time of delivery. Inasmuch as assistance is absolutely necessary in order to accurately close such a wound, the writer is disposed to advise that after the expulsion of the placenta the vagina be irrigated with 1 in 2,000 perchloride of mercury solution, the wound covered with sterile gauze and the patient's legs tied together and her thighs flexed over a pillow, the operation of repair being left until the following day, when due precautions can be made for its being satisfactorily carried out and the patient will have recovered somewhat from the effects of her delivery.

The parts should be completely shaved, cleaned with ether soap and water, and the skin swabbed with 1 in 1,000 perchloride of mercury solution before the sutures are applied. The rectum should first be repaired, and in order to prevent tension it may be necessary to deepen the sulci on either side of the torn bowel with a gentle sweep of the knife. The upper angle of the rectal wound is seized by a pair of Kocher's forceps, and the first stitch of catgut is passed through the mucous membrane from within outwards and over the forceps above the angle of the tear and then through the mucosa on the other side from within. Both ends of the ligature now lie towards the lumen of the gut where they should be tied, thus leaving the knot in the lumen of the bowel and not on the external or connective tissue aspect. The number of interrupted sutures will vary with the extent of the tear; the last stitch will pass through the margin of the restored anus. The edges of the sphincter should be found and approximated by stitches, and, what is most important, the receded fibres of the levatores ani should be drawn together over the rectum by buried catgut sutures. For the remainder of the closure fishing-gut sutures are to be used. The lower three stitches are passed through skin and perineal body on the one side, then centrally they pass through the rectum and finally through perineal body and skin of the opposite side; the upper four or five sutures take in the depths of the wound the vaginal tissue only. The suturing is begun posteriorly, *i.e.*, at the anus, the last stitch being the one to close the vulva. The buried catgut stitches become absorbed; the silkworm-gut is removed on

the tenth day. A few superficial catgut stitches are often required to complete the apposition of the skin of the perineum. Some operators plug the rectum with gauze and leave it for a couple of days: others insert a drainage tube and leave it for the same time. The rectum should be emptied by an enema before operation, and no movement of the bowel should be allowed to occur for two days after the operation. In so extensive an operation it is as well to tie the patient's thighs together as well as to flex them upon a pillow. Catheterisation is not required. The same caution not to pass the sutures too close to the edges of the tear applies here as in operations for tears of slightest degree, and they must not be drawn too tightly.

Attempts to repair perineal wounds of the third degree (complete rupture) at the time of confinement frequently lead to failure, either partial with recto-vaginal fistulæ or complete with a permanent cloaca which will require secondary closure.

The operator should work with gloved hands in all these operations.

As a result of neglect to repair a torn perineum, and as the outcome of diastasis of the fibres of the levatores ani, which embrace the vaginal walls, prolapse of the latter commonly follows, especially after repeated labours and in patients who suffer from the straining due to coughing in chronic bronchitis. Rectocele and cystocele follow and may be regarded as hernia of the bowel and bladder respectively through the fibres of the levator ani muscles. The principle, which underlies the operations for the restoration of parts under these conditions, is apposition of the fibres of the levatores ani after the bowel or bladder has been freed and the hernia reduced.

For a full description of the operations for rectocele and cystocele the reader is referred to the section on Affections of the Vagina (p. 545).

The treatment of Rupture of the Uterus is described later (p. 238).

CUTHBERT LOCKYER.

POST-PARTUM HÆMORRHAGE.

HÆMORRHAGE which occurs from any part of the parturient canal after completion of the second stage of labour is called post-partum hæmorrhage; the expression is used to cover loss of blood before expulsion of the placenta as well as after this event. When it occurs immediately or within twenty-four hours of the birth of the child it is termed primary, whilst the hæmorrhage which may occur later in the puerperium is spoken of as secondary post-partum hæmorrhage. Post-partum hæmorrhage may be concealed or external. The blood may proceed from the placental site or from a rupture in the uterine wall or from the cervix, vagina and perineum.

Post-partum hæmorrhage is a very serious complication of labour, and therefore the causes which lead to it and the principles which underlie the preventive treatment cannot be too carefully studied. There is no doubt that the large majority of cases are due to malpraxis in the second and third stages of labour, but there are a few instances on record which prove that severe hæmorrhage can occur independently of the management of the case.

The protection afforded by nature in the prevention of hæmorrhage is worthy of consideration, since success in treatment depends upon a proper understanding of nature's way of preventing hæmorrhage.

During pregnancy the musculature of the uterus, its vessels, and the character of the patient's blood, all undergo important changes. As regards the muscle fibres, in addition to their undergoing hypertrophy and hyperplasia, some of them arrange themselves longitudinally, so that the vessels of the uterus run between them in the form of channels; other fibres take a circular course and embrace the vessels as sphincters. This arrangement admirably adapts itself to perform the function of constricting and obliterating the vessels during uterine contraction, and of keeping up the closure of the vascular canals permanently by retraction. Then the vessels themselves permit of this closure the more readily from the fact that, although they are bigger and accommodate more blood during pregnancy, nevertheless they have lost much of their adventitia and middle coats and are represented by their tunica

intima only ; this is a thin, elastic, resilient and easily compressible coat, which retracts into the muscular uterine wall at the time of placental separation, so that the mouths of the vessels are actually stopped by the uterine muscle into which they have receded. Next, with regard to the blood, it is well known that its power of coagulability is increased during the gestation period, and that its flow in the vascular sinuses is slowed ; this, again, favours diapedesis of the white discs, and all three processes favour obstruction to the flow of blood at the points of laceration of the vessels, which inevitably occurs during the separation of the placenta. Again, actual thrombosis is a preventative factor, although perhaps of secondary importance, since it allows of a temporary relaxation of the uterus without loss of blood intervening in the interval.

The predisposing causes of post-partum hæmorrhage have an important bearing upon its treatment, since it is well to anticipate and estimate risks before they occur. Rapidly repeated child-bearing is known to favour muscular weakness, if not actual degeneration, and to predispose to secondary inertia, and hence to post-partum hæmorrhage. Pauperism, with all that it means, may lead to the same condition. At the other extreme, delicately nurtured and emotional women with but little physical development are more liable to post-partum hæmorrhage than are their hard-working sisters, just as they are more liable to menorrhagia than those of the latter class. Residence in tropical climates, overdistension of the uterus from hydramnios or from twins, precipitate or protracted labour, partial or complete inversion, prolonged chloroform anæsthesia, are conditions which increase the likelihood of uterine inertia and post-partum hæmorrhage. Finally, ante-partum hæmorrhage, hæmophilia, leucocythæmia, albuminuria, alcoholism, plumbism and malaria, are all to be included amongst the predisposing causes.

Exciting Causes of Post-partum Hæmorrhage.—Too rapid delivery accounts for a large percentage of cases in which this complication of labour occurs. Delivery during a period of uterine atony or secondary inertia should never be attempted : extraction of the breech, delivery by forceps or the cephalotribe, when carried out during temporary uterine passiveness, is fraught with the greatest danger to the patient. "*Never deliver the child in the absence of a pain*" is an obstetric axiom which cannot be too forcibly insisted upon.

The danger of post-partum hæmorrhage is by no means passed when the child is safely delivered, for at this stage of parturition the uterus not infrequently passes into a state of idleness. Effective

pains may subside for a period long enough to tax the patience of the attendant and not infrequently lead the injudicious midwife to conclude that the placenta is pathologically adherent. This state of uterine inactivity is also referred to in the chapter dealing with Retained Placenta, but we must here emphasise the importance of keeping a hand upon the uterus after the child is born and maintaining gentle massage of the organ during and after the completion of the third stage. Unless this is done, the uterus may relax and even fill with blood without external hæmorrhage enough to excite suspicion, then comes a furious rush of blood and the patient's condition may be hopeless in a few minutes. Reflex post-partum inertia may be caused by a distended bladder or rectum. Emotional causes, such as anger and fright, may produce this complication. Retained products (placental tissue, membranes, and blood clot), by interfering with uterine contraction, may set up primary as well as secondary post-partum hæmorrhage. Incomplete retraction is also produced by the mechanical obstruction offered by a fibroid tumour. Hæmorrhage due to rupture of the uterus produced spontaneously or during extraction will be dealt with in the section on Lacerations of the Genital Tract.

Post-partum hæmorrhage, as before stated, may be open or concealed. When the bleeding is *external* the diagnosis is obvious. The first complaint from the patient will be a feeling of faintness and that she feels something flowing away from her. The loss may be a slight trickle or a regular torrent. The uterus will be found to be soft and flabby, or the outline may be so indistinct as to be missed altogether, especially if the abdominal walls are fat and thick. The fundus may rise to a height above the umbilical level; blood clots in the uterus are felt as hard lumps which shift their position when the fundus is grasped by the hand. If these physical signs are neglected, the symptoms of syncope soon intervene and the patient's pulse rate is increased, its tension diminished, and its character thready. The state of the pulse affords a valuable danger signal and demands a careful examination. In the *concealed* variety the signs of shock are perhaps the first that will be noticed, but if the hand is placed upon the uterus, its increase in size and the altered tension will be felt. Signs of syncope after labour may not be due to hæmorrhage at all. Precipitate labour or, what amounts to the same thing, rapid emptying of the uterus, may produce it; sudden relief of pressure is occasioned thereby, and the blood is determined to the pelvic organs so rapidly as to produce cerebral anæmia. Raising the foot of the bed and a tight binder is the proper treatment for such a condition. Rapid enlargement of

the abdomen from distension of the intestines by gas is said to cause faintness; again, hysterical attacks have been mistaken for syncope, but in either case a physical examination will exclude the presence of concealed hæmorrhage.

In cases where post-partum hæmorrhage occurs from cervical laceration the uterus will be felt to be firmly contracted, and if a speculum is passed, the site of the bleeding point may be detected. In these instances the bleeding may be severe, but it never occurs in rushes or torrents, as it does in true post-partum hæmorrhage from uterine inertia. The blood is one continuous trickle which goes on, and it may not start until an interval of ten or fifteen minutes after the birth of the child. In the chapter dealing with Inversion of the Uterus it is stated that this disaster causes post-partum hæmorrhage; the partial inversion with the bleeding so caused is considered by German authorities to be due to paralysis of the placental site, which takes place in uteri which otherwise contract firmly. This is a rare condition which many observers have never seen. It has been also stated that rarely post-partum hæmorrhage occurs in a perfectly contracted uterus, the hæmorrhage coming from a ruptured hæmatoma or from an aneurysmal vessel. Finally, it ought to be remembered that uterine atony and lacerations may occur together, so that in all cases of hæmorrhage a most careful examination should always be made.

The treatment of this complication should first be directed towards prophylaxis. The general conditions already mentioned as predisposing to the hæmorrhagic diathesis should be treated. A woman who has had a precipitate labour should be cautioned not to go about towards the end of her term. Violent bearing down should be discouraged and the uterus should never be rapidly emptied. On the other hand, delay in labour must be treated by *assisting delivery before the patient becomes exhausted* (i.e., the timely application of forceps), as exhaustion is a frequent source of uterine hæmorrhage. The over-distension produced by hydramnios should be relieved by rupturing the membranes early. Most important of all is the proper management of the last stage of labour, and we would repeat the caution already given that the hand should be kept on the fundus from the time that the child leaves the uterus until the expulsion of the placenta, and also for at least twenty minutes afterwards. If this simple rule is carried out, bad post-partum hæmorrhage would rarely occur. After the expulsion of the placenta 1 or 2 drachms of the liquid extract of ergot should be given, or 10 min. of ernutin may be injected into the buttock. The placental membranes should always be carefully

examined after the labour is concluded, and the child should be put to the breast.

The actual **treatment** consists in evacuating the uterus, securing permanent contraction (retraction) and making up for the loss of blood; therefore fragments of placenta and blood clots must be cleared out; this should first be attempted by Credé's method (Fig. 1), *i.e.*, by grasping the fundus, squeezing the uterus and



FIG. 1.—Credé's method of expression.

compressing it in the proper axis, *viz.*, downwards and backwards. If this fails, the gloved hand must be passed into the uterine cavity, the clots cleared out and the fragments of placenta separated in the manner described in the section dealing with adherent placenta. Having assured ourselves that the uterus is empty, the next duty is to imitate nature by securing permanent contraction. Unless uterine exhaustion is absolute, the muscle fibres may be stimulated to contract and retract by the administration of a hot intra-uterine

douche. That recommended consists of 2 drachms of the tincture of iodine to 1 pint of sterile water at 120° F. It should be given through a Budin's double-channelled glass catheter, which has been previously boiled; several pints may be used. The catheter should be introduced between the fingers and thumb, held cone fashion, and carried well up into the uterine cavity, so that the flow plays directly upon the placental site. Whilst this is being done, the left hand controls and grasps the fundus (Fig. 2). In very extreme cases of post-partum inertia the uterus refuses to respond to the

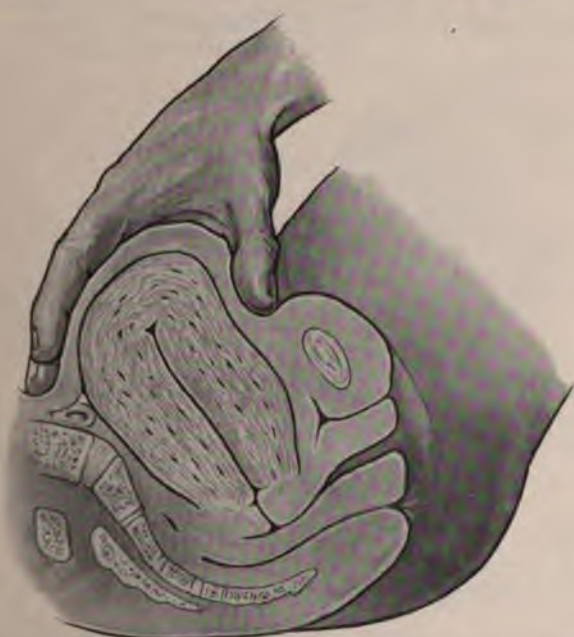


FIG. 2.—Compression of the fundus for the control of post-partum hæmorrhage.

stimulation of a hot douche and it becomes necessary to employ Breisky's method of bi-manual compression (Fig. 3). This manipulation is carried out as follows: The patient, who has already been placed upon her back for the delivery of the placenta, is now brought into the cross-bed position; if assistance is not at hand, her feet and legs can be made to rest on two chairs. The attendant then introduces his left hand, gloved and cone-shaped, into the vagina, and as soon as the hand has passed the vulva a fist is formed with the knuckles pointing backwards. The fist is pushed as far as the anterior fornix and the proximal phalanges make a shelf below the uterus whilst the cervix lies

posteriorly, *i.e.*, behind the hand and out of the line of pressure. The back of the left forearm rests upon the edge of the bed. The right hand, which has all the work to do, now brings the fundus down and compresses it upon the fist of the left, which is waiting to support it, and in this way the entire body of the uterus can be effectually squeezed between the downwardly directed palm of the right and the upwardly directed fist of the left hand. Pressure can in this way be maintained for a considerable time and the abdominal aorta can at the same time be pressed upon by the knuckles of the right hand. Another method has been devised by Gooch, but it is not so good as the former. It consists in inserting



FIG. 3.—Bi-manual compression for the control of post-partum hæmorrhage.

a fist into the uterine cavity, whilst the other hand is employed in grasping the fundus and compressing the wall of the uterus upon the fist in its cavity. If a hand is inserted into the uterus in this way, it must only be withdrawn during a pain. If bi-manual compression is not successful, resource must be had to packing the cavity of the uterus with strips of bismuth gauze. The gauze should be 3 inches wide and from 2 to 3 feet in length. To plug effectually, the cervix is first drawn down by means of a volsellum (Fig. 4), the gauze is then introduced on a long probe or by forceps (Fig. 5) and carried right up to the fundus, which, with the entire body of the uterus, is tightly packed. The strips are counted and finally tied together by a strand of silk. The vagina is then packed

with gauze in the same way and another dose of ernutin is injected into the buttock. The packing may be left in for eight hours.

Efforts to effect thrombosis used to be employed, but this treatment is attended with risks of sepsis, and such drugs as liquid perchloride of iron are no longer used. If it is impossible to secure a sterile medicated gauze, the uterus can be plugged with boiled



FIG. 4.—Volsellum.

bandages or boiled household linen, but both are inefficient substitutes. A uterus plugged with gauze should be compressed from above by a firm binder and the urine should be drawn off before the plugging is complete.

Lacerations in the lower genital tract, vagina and perineum should be treated by primary suture. This is indicated for the sake of hæmostasis and also as a preventive to risk of septic infection later. Tears in the cervix should always be sewn up as soon as discovered; if they extend through the cervix and vaginal

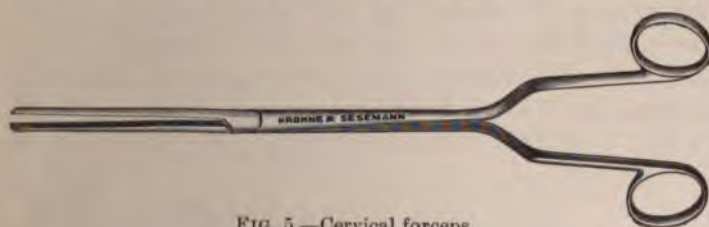


FIG. 5.—Cervical forceps.

vault into the peritoneum, the cervix may be sutured and the tear into the cellular tissues plugged with bismuth gauze. Rupture of the lower uterine segment has again and again been successfully treated by gauze plugging, when the rent has been out of reach and impossible to suture from the vagina. Escape of the child or placenta through a complete tear into the abdominal cavity calls for immediate laparotomy, a point which will be fully dealt with in the section on Rupture of the Uterus (p. 238).

In severe cases of post-partum hæmorrhage it is necessary, as

soon as the bleeding is checked, to turn our attention to the *treatment of severe anæmia and shock*. Normal saline solution should be administered in large quantities, both by the rectum and sub-



FIG. 6.—Venous infusion.

cutaneously along the outer margin of the pectoralis minor, by means of a cannula, such as that shown in Fig. 6. In cases of extreme shock a quicker method is to introduce a cannula into the median basilic vein, and a very handy apparatus devised by the late Peter Horrocks for carrying out this minor operation should find a place in every obstetric bag (Fig. 6). Sterile tablets of sodium chloride and also of a salt preparation of the proportions found in the blood are prepared by well-known drug firms and supplied in glass tubes; these

should always be carried by the obstetrician, and are to be preferred to household or common salt. Nothing is needed to administer a subcutaneous injection of saline solution (1 drachm to the pint) but a small funnel, a piece of drainage tube (1 yard long), and a cannula of medium calibre (Fig. 7). We do not



FIG. 7.—Cannula for subcutaneous infusion.

advise that the injection be given under the breast but to the outer side of it, with the needle pointing towards the axilla. The attendant should stand on the opposite side of the patient for injection into the left breast, and upon the same side for injection into the right. As much as a pint and a half may be safely given into

each axilla, and it is advisable to control the flow so that the tissues are not distended too rapidly, or sloughing may follow. This accident is far more likely to happen when the fluid is run into or beneath the mammary tissue than when the needle is inserted outside the breast halfway along the pectoralis minor muscle. The line traversed by the cannula should be upwards and outwards, and the best guide to take is the outer border of the lesser pectoralis. In addition to infusion, auto-transfusion should be carried out. This is done by exerting graduated pressure upon the vessels of the extremities by means of bandages and by raising the foot of the bed on blocks 12 to 18 inches high. Cardiac stimulants are to be administered by the mouth and by hypodermic injection.

Strychnine in hypodermic doses of $\frac{1}{30}$ to $\frac{1}{60}$ gr. is most useful. Small doses of morphine or atropine will relieve restlessness and pain and tend to induce sleep. Prolonged rest, and fluid nourishment in frequent small amounts, are essential, and later on alcohol may be given, but at first it must be limited to little sips of brandy, and great care must be exercised in its employment. The puerperium is prolonged after post-partum hæmorrhage, as involution is much slower than normal and the risk of puerperal sepsis is increased.

CUTHBERT LOCKYER.

PRECIPITATE LABOUR.

If labour has once been precipitate, it is extremely probable that each subsequent labour will be precipitate. Apart from this we have no means of telling whether a labour will be precipitate or not. This process seems to be peculiar to certain individuals, and in many cases is also practically painless.

Hence women, who have once had a precipitate labour, should never during the last few weeks of pregnancy go far from home, and should have a nurse in close attendance constantly. Small doses of bromides or opium may perhaps be given, as in the treatment of threatened abortion, and it has been stated that an abdominal binder sometimes prevents this accident.

From the very beginning of labour the patient must be kept in bed and the use of the bedpan must be insisted on. Bearing-down efforts must be forbidden, and the woman should be encouraged to cry out during her pains. Chloroform should be given to control the pains, and is much more effective for this purpose than morphia.

In the second stage of labour the semiprone position of Sims should be adopted, and the presenting part should be retarded manually as soon as it appears at the vulva.

The third stage must never be hurried, but the uterus must be given plenty of time to retract, since post-partum hæmorrhage is rather apt to occur.

G. F. DARWALL SMITH.

RETAINED PLACENTA.

THE placenta, as a whole, with its membranes, may be retained in cases of inevitable abortion during the first half of pregnancy, or this may occur as a complication of labour at term. In fact, we have to consider the condition under the following headings: (1) Missed abortion; (2) incomplete abortion; (3) delay in the third stage of labour at term.

Retained Placenta in Missed Abortion.—The embryo has perished and the products of conception often assume the character of a carneous mole; in this condition they may be retained for a period of months. All the usual signs of pregnancy subside, the uterus becomes firmer and, eventually, smaller than the dates of conception would warrant; there is an irregular sanguineous or brownish discharge; the breast changes subside, and the woman may show signs of cachexia. The treatment which follows a correct diagnosis will largely depend upon the effect of the dead ovum upon the patient's health. When the latter is not notably affected, the case may be left to nature in the hope that the uterus will expel its contents after the lapse of a few weeks; and this advice is certainly to be followed when there is uncertainty as to the fate of the embryo, *i.e.*, whether it is still alive or dead. The mere presence of a brownish discharge is no indication of foetal death, since it may be due in the early months to endometritis of the lower zone of an intensity insufficient to impair the growth of the ovum or interrupt the pregnancy. The most valuable sign, and one which should be waited for, is shrinkage in size of the uterus, and to get this it is necessary to wait a few weeks after suspicions of foetal death are aroused. The treatment of *emptying the uterus* is indicated in these cases: (1) When cachexia supervenes; (2) for hæmorrhage and offensive discharge; and (3) for protracted retention of the products of conception. The methods to be adopted are as follows: Pass a sound with all antiseptic precautions, and give a few full doses of the liquid extract of ergot, keeping the patient in bed in the meanwhile. If the os is patulous, and it often is not, pack it with bismuth gauze and treat the vagina in the same way. Bismuth gauze has the advantage of never getting foul in the vagina, a property not possessed by iodoform gauze, even when

used at a strength of 10 per cent. Should these means fail, it will be necessary to give an anæsthetic and employ rapid dilatation by means of Hegar's dilators (Fig. 1), and then remove the blighted ovum by the fingers or piecemeal by means of ovum forceps (Fig. 2), as described under Incomplete Abortion. The subsequent

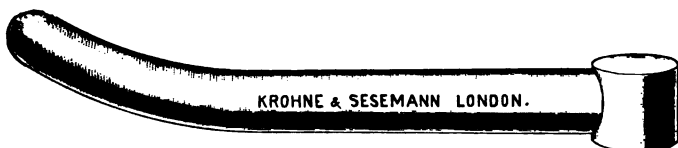


FIG. 1.—Type of graduated metal dilator.

flushing of the uterus and after-treatment are the same as that employed in cases of incomplete abortion (*vide infra*).

Retained Placenta in Incomplete Abortion.—The embryo has escaped but the incipient placenta is retained. This may cause hæmorrhage, or the retained products may decompose and subject the patient to the risks of sepsis. It is of importance, therefore, to effect an early complete evacuation of the uterus, and by “early” we mean within twelve or twenty-four hours of the expulsion of the foetus. To bring this about it may suffice to plug the vagina and cervix with bismuth gauze, which should be removed at the end of twelve hours, and if this treatment proves successful the



FIG. 2.—Ovum forceps.

placenta will be found lying on the gauze plug. If this has not happened, the placenta is adherent and must be removed. If the cervix is large enough to admit the finger, digital evacuation of the uterus is sometimes possible without the aid of an anæsthetic.

If the os is closed, as it is apt to be after a considerable time has elapsed since the expulsion of the foetus, an anæsthetic is given, the os is dilated with Hegar's dilators, and the placenta removed by ovum forceps (Fig. 2) and a blunt curette. The ovum forceps we recommend has a maximum width of $\frac{1}{2}$ inch, and has

transverse ridges which fit into each other when the two blades are in apposition. There is a catch near the handle, as in the ordinary Spencer Wells' forceps, in order to prevent the instrument from losing its hold after the portion of tissue to be removed is secured in its grasp. The blunt curette should be made so as to irrigate at the same time (flushing curette: Fig. 3), and this ensures that no loose particles are left behind. After flushing out the uterus with iodine solution (2 drachms to the pint), it is well to swab the

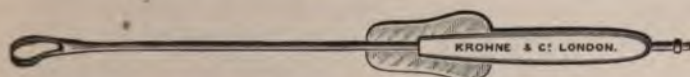


FIG. 3.—Flushing curette, Roulte's pattern.

surface of the cavity with a strong solution of iodine. That used at the Samaritan Hospital is made up of: Resublimed Iodine, 3j; Iodide of Potassium, 3j; Rectified Spirit, 3ij; Distilled Water, 3ij. Into this solution a Playfair's probe dressed with sterile wool is dipped, and the probe is introduced as far as the fundus and the cavity thoroughly swabbed. Finally, a drain of ribbon bismuth gauze (1 inch wide) is inserted by means of cervical forceps (Fig. 4), and left *in situ* for twelve to twenty-four hours. The patient is kept in bed for ten days, the bowels are regulated by saline aperients, and the involution of the uterus is aided by an



FIG. 4.—Cervical forceps.

administration of an acid-ergot mixture, such as: Extracti Ergotæ Liq., ℥30; Acidi Sulphurici Dil., ℥20; Magnesii Sulphatis, gr. 20; Aquam Cinnamomi, ad 3j. As a rule, no further douching is necessary after the use of the flushing curette, but in cases where the placental tissue has undergone decomposition prior to operation it is advisable to douche the vagina daily until the discharge is quite odourless.

In the treatment of retained placental tissue dilatation of a closed cervix by means of laminaria tents has no place.

The Placental or Fibrinous Polypus.—In cases of incomplete abortion and also after labour at term, a small piece of placental tissue may be retained without undergoing decomposition, owing to its blood supply being sufficiently maintained to keep the tissue alive. After labour at term such retention is explained by the presence of an accessory or succenturiate placenta, which represents an isolated area of chorion frondosum which should have been converted into chorion laeve at the time of formation of the discoid placenta. If an accessory placenta is retained, the fact will be discovered by a careful examination of the chorion laeve after expulsion of the placenta; the smooth chorionic membrane will be

deficient over the area corresponding to the retained tissue; if, therefore, there is a defect in the continuity of the chorion at some distance from its attachment to the edge of the placenta, it should be borne in mind that the part wanting may represent an accessory placental lobe which has been left behind.



FIG. 5.—Adherent placenta.
(Placenta accreta.)

Placental tissue which is retained and which is kept in the "quick" state by sufficient blood supply causes the same train of symptoms as those observed in other polypi. The involution of the uterus is checked, the organ remains larger than normal, and metrorrhagia results. So long as the

tissue remains alive, putrefaction and foul discharge do not occur. In the writer's private collection there is a placental polypus which was removed four months after delivery but which was quite "sweet" at the time of operation. Such portions of placenta are much more likely to be retained for long periods than if decomposition had set in, since they do not necessarily cause symptoms for some weeks; there may be no irregular hæmorrhage at first and the sub-involuted state of the uterus may be overlooked.

The treatment in every case is removal by the method already described, and the uterus should be curetted at the same time, as a hypertrophic state of the endometrium, known as "fungus endometritis," is a common accompaniment of placental polypus.

The placenta is often retained when abortion occurs in a uterus which is the seat of a submucous or interstitial fibroid tumour. The growth may project into the cavity below the placental site and so render delivery of the afterbirth extremely difficult; such cases are prone to lead to great loss of blood from partial separation of the placenta. In a case of this kind which came under the writer's care there had been severe hæmorrhage which reduced the patient, a strong woman, to the verge of collapse. The os was patulous and the examining finger felt the lower pole of a fibroid growth just above the cervical canal. Under anæsthesia the growth was found to occupy the right half of the uterine cavity and the placenta could be felt lying in the right cornu; digital separation was impossible as the fingers could not reach the fundus owing to the obstruction by the convex tumour; removal was effected by ovum forceps, and the cavity of the uterus was flushed out, as previously described.¹



FIG. 6.—Retention of placenta from uterine atony.

Retained Placenta at Term or Delay in the Third Stage of Labour.—The placenta and membranes are said to be “retained” when these structures have not been expelled within one hour after the birth of the

child. Cases occur in which the third stage of labour is thought to be complete, and yet placental tissue may be left behind, *i.e.*, an entire placenta may be expelled spontaneously or by expression, and still the uterus contains a placental lobule which had an independent existence; such secondary placentæ are due to developmental error and are not common; their significance has already been referred to under the heading Placental Polypus.

The causes of retained placental membranes are: (1) Adhesion of the placenta (Fig. 5) due to decidual endometritis: this condition is far less common than is usually supposed. In taking the past

histories of patients in the out-patient departments of hospital is often stated by them that "the afterbirth was grown to the side of the uterus," this being a very common expression of the old type of midwifery, who explains all cases of delayed third stage on this supposition. The condition is very rare and is always partial (Fig. 6). (2) Uterine inertia: this is by far the commonest cause of delay in the third stage of labour. Powerful and regular contractions



FIG. 7.—Retained placenta from hour-glass contraction of uterus.

occur up to the time of expulsion of the child, and then either cease entirely, or alter their character and become feeble and infrequent. It is then that the impatient attendant may be tempted to use ergot, and tetanoid contractions and tightening of the internal os have been set up in this way. (3) Hour-glass contraction is another cause of retention; some say this is also due to the abuse of ergot, others deny it (Figs. 7, 8). (4) Congenital malformation of the uterus may lead to incarceration of the placenta as a whole. (5) Improper management of the third stage of labour may

in retention of portions of placental membranes; therefore, in discussing the treatment of placental retention, it is necessary to call attention to the proper management of labour in the second and third stage, as retention is due in many instances to avoidable causes. During the delivery of the child the uterus should be followed down by a hand grasping the fundus, and no traction should be made on any part of the child's body. The fundal grip should be maintained after the birth of the child, but premature compression must be avoided. At least one half-hour should elapse before Credé's expulsion by pressing the fundus downwards and backwards

is adopted, and then this should only be done during a pain. Ergot should not be administered either by the mouth or hypodermically before the uterus is empty, for this drug is liable to cause contraction in any part of the lower segment, which will lead to incarceration

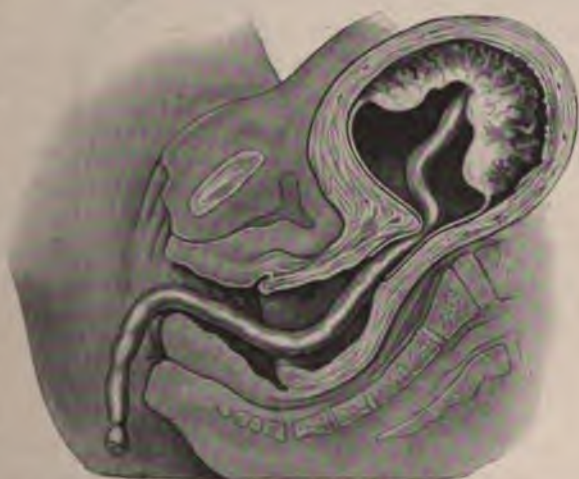


FIG. 8.—Retained placenta from hour-glass contraction.

of the placenta in the upper non-responsive part of the uterus. If strict attention is paid to these simple details, non-expulsion of the placenta will be a rare occurrence.

The importance of non-expulsion of the placenta lies in the fact that it may be a cause of hæmorrhage. If the placenta maintains its firm relations with that part of the uterine wall which constitutes the placental site, no hæmorrhage will occur, whether its attachment is normal or abnormal and due to adhesions, because the utero-placental vessels remain undisturbed. Usually free bleeding in the third stage will indicate detachment of some limited portion of the placenta, whilst the remainder maintains firm union. More rarely such early post-partum hæmorrhage is caused by some laceration lower down in the uterine tract, but such a lesion will be considered in the section dealing with the subject of post-partum

hæmorrhage. The reason why there is hæmorrhage in p detachment of the placenta is obvious; such cases occi injudicious traction from below, in short, from mismanageme the third stage and interference during uterine atony, whe protective function of uterine contraction and retraction a abeyance, and in such cases the hæmorrhage may be exce On the other hand, there may be no bleeding at all with a ret placenta; the organ is then simply adherent or patholog adherent (placenta accreta), or, again, it may be incarcerated



FIG. 9.—Clover's crutch.

lower uterine spasm. The treatment will therefore vary acco to whether hæmorrhage is present or whether it is not. In ca uterine inertia in which there is no hæmorrhage the condition urgent; delay is not harmful, and hurried delivery is unjusti and dangerous; at least one hour should elapse before interfe and by that time the uterus will regain sufficient tone by the stimulation which gentle kneading affords, to render expulsio Credé's manœuvre justifiable and successful in the major cases. More rarely simple adhesion of the placenta will r

digital separation, a manipulation which is described in dealing with placenta accreta. Morbid adhesion, or placenta accreta, is a condition which is indistinguishable until after digital separation, a procedure which is attendant with some difficulty owing to the existence of dense fibrous bands or to a most obstinate and intimate union of uterine and placental surfaces. An anæsthetic must be given. The patient is placed in the cross-bed position, the legs are drawn up into the lithotomy attitude and maintained by a Clover's crutch (Fig. 9), or failing it, the legs are to be held aside by attendants. The procedure must be carried out under strict antiseptic precautions. Excess of vulval hair should be removed, the vulva scrubbed with ether soap and swabbed with acetone or 1 in 1,000 biniodide of mercury solution. The accoucheur must scrub his hands with a nail brush in soft soap and water, rinse them in several changes of water, and soak them for several minutes in a spiritous solution of biniodide of mercury (1 in 1,000), rubbing the spirit well into his nails with a sterile swab. He should then put on a pair of previously boiled rubber gloves, which should not be allowed to touch any non-sterilised article prior to introducing his hand into the vagina and uterus. There is no need to give a vaginal douche before introducing the hand, the vagina having been flushed out by the escape of liquor amnii during the first and second stages. The right hand should be used internally whilst the left is employed in steadying the fundus and bringing it within reach of the hand in the uterus. The method of introducing the right hand is as follows: separate the labia by the thumb and a finger of the left hand, arrange the fingers of the right hand in the form of a cone, and introduce the whole hand carefully and cautiously into the vagina and then into the uterus; there is no need to draw down the cervix, and the cord will be a guide to where the placenta is situated. When once the right hand is inside the uterus, its shape is altered; instead of maintaining the conical shape the fingers are straightened out, but kept closely pressed together in order to form a wide spatula. The flattened hand with fingers pressed together is then introduced between the membranes and the uterus, until the edge of the placenta is reached; then a sweeping to-and-fro movement is employed with the ulna edge of the flattened out and compressed fingers, and this is persevered in until the top of the fundus is reached, when, with the left hand still steadying the uterine wall (Fig. 10), the same movements by the right are carried out on the other side, until the whole placenta is freed and can be carried downwards towards the os with the maternal surface in the

palm of the right hand. This method, when employed for simple retention, presents no difficulty, but in the case of pathological adhesions it is sometimes very difficult to insinuate the hand between the membranes and the uterine wall, and the difficulty does not end there, for there are often tough fibrous bands uniting



FIG. 10.—Removal of an adherent placenta.
(From Galabin and Blacker's Practice of Midwifery.)

the placental cotyledons to the placental site and these need breaking down, and may require scraping through or detaching with the finger and thumb.

The use of the finger-nails is impossible when gloves are used, and some authorities have even advised cutting off the tip of the index finger of the glove and capping the exposed finger with new skin, but this is not to be recommended; the more we accustom

ourselves to the use of rubber gloves in obstetrics the more efficient we become in the use of them; the writer strongly advocates every practitioner of obstetrics to use gloves for all intra-uterine explorations which require the insertion of a hand or hands, and this advice has the support of all obstetricians who have the care of patients in the large lying-in hospitals.

After the placenta is removed, it must be placed in a large basin of sterile water; the two outspread hands are placed beneath it, and in this way it is opened out as a flattened disc on the palms of both hands. Next the hands are opened and closed as if hinged on their ulnar borders, whilst the practitioner watches the maternal surface to see if the sulci open and then close up in accurate apposition. In this way a missing bit of placental tissue will be detected, and if suspected it must be sought for. Then the entire placenta is held up by its cord, which has the effect of inverting its surfaces and causing the fetal aspect to be exposed externally and the membranes to hang down. The edge of the placenta where chorion and placenta are continuous must be carefully examined all round in order to see that no chorion is missing. The aperture from which the child escapes is next investigated; it generally ends short of the placental margin. If it runs up to the margin, the distance from between the edges of the membranes on either side must be noted, as a triangular piece of membrane may have been torn away from this part of the placental circumference. Holes other than the one provided for the escape of the child will, if present, be demonstrated whilst the tissues are held up by the cord; any deficiency in the membranes with a vessel or vessels leading to it will point to a secondary placental lobule not yet removed, and this will necessitate a second search. If it is decided that the placenta is intact, but that a piece of membrane has been left behind, it is advised that the retained membrane be left alone to come away by itself, for if the accoucheur is sure of his asepsis inside the uterus a piece of membrane will not become septic, but is usually expelled during the involution of the uterus in a very few days. It comes to this: pieces of placenta even in an aseptic case must be removed, but bits of membrane had better be left to come away of themselves, because the retained portions of placenta will form fibrinous polypi, which interfere with involution, cause secondary post-partum hæmorrhage and keep up metrorrhagia, and therefore will necessitate a second operation; on the other hand bits of membrane will come away without causing any untoward symptom.

After manual removal of the placenta, a hot intra-uterine douche

of sterilised water at 115° F. or perchloride of mercury solution (1 in 2,000) or lysol (1 drachm to 2 pints) should be given.

The main object of this procedure is to stimulate the uterus to contract and to remove any clots which may be retained, but when weak antiseptics are used they are intended to counteract the possible effects of germs introduced without through the air or on the hands during exploration. An ampulle of ernutin (m10) should be given by introducing a hypodermic needle into the muscles of the buttock; the needle should be fine but strong, and sharp enough not to break off; it should be inserted vertically for at least 1 inch or 1½ inches through the previously sterilised skin of the gluteal region. For this small operation an all-glass syringe is recommended, as it is easily boiled, whilst the needle should be made of a material which can be flamed in a spirit lamp, or else it must be sterilised in pure spirit.

Carelessness in following the above technique may result in incomplete removal of the placenta, or in troublesome bleeding, or even in perforation of the uterus and general septicæmia. In the case of true adhesion of the placenta it is necessary to add that sometimes the use of the fingers must be augmented by the ovum forceps, but it is never admissible to use a curette, as the walls of a parturient uterus are essentially soft and friable and easily perforated. In irregular retraction or partial uterine spasm where the placenta is definitely incarcerated in an upper atonic sac, it becomes necessary to overcome the contraction ring, and this is done partly by the aid of drugs and partly by mechanical dilatation. The best drug for the purpose is morphia. A full hypodermic dose is given and supplemented by a general anæsthetic. For the dilatation mechanical devices are used by some, but it is generally possible to overcome the spasm by the operator's hand; the fingers are shaped in a cone-like manner, and the finger tips gradually introduced through the ring, which slowly relaxes and allows more and more of the hand to pass until the placenta is reached, when the separation is carried out in the manner already described.

We have so far only dealt with the treatment of retained placenta in cases in which there is no hæmorrhage, and have seen that under such conditions there is no need to be in a hurry, as the condition is in itself not dangerous. It is far otherwise when to the retention there is added a partial separation, for, as already stated, it is in these cases that alarming hæmorrhage occurs and calls for speedy action, for a woman may bleed to death in a few minutes if left alone. The treatment here admits of no delay whatever; the separation must be rendered complete by digital

manipulation such as that already described, and the entire placenta removed in the manner already indicated. The subsequent treatment is fully discussed in the section dealing with post-partum hæmorrhage.

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RUPTURE OF THE UTERUS.

RUPTURE of the uterus is the most serious of all obstetric lesions. It occurs generally as an accident to labour, but in rare instances the uterus has ruptured during pregnancy, as the result of the yielding of an old Cæsarean scar or from trauma. In cases in which pregnancy occurs in an undeveloped horn of a uterus bicornis rupture will occur before the fifth month of gestation; the signs, symptoms and treatment will be the same as those for ectopic pregnancy. When rupture occurs during pregnancy, the rent will be found in the upper segment of the uterus, *e.g.*, in cornual pregnancy it is nearly always across the fundus; when due to previous Cæsarean section, the site of the scar will determine the position of the tear; when due to a fall or blow, the position of impact with the uterus will determine the situation of the laceration.

The commonest site, however, for rupture is in the lower uterine segment (Figs. 1 and 2), and the tear may at the same time involve the entire cervix and upper part of the vagina (Fig. 3). This is the situation in which traumatic rupture produced during labour is to be found. Rupture of the lower uterine segment is preceded by extreme stretching and thinning of this dilatable part of the uterus (Fig. 1), a state of affairs produced by obstructed labour. In the presence of an insuperable barrier to delivery the polarity of the uterus becomes enormously exaggerated. The active upper segment becomes thicker as the passive lower segment becomes thinned and expanded. The line of demarcation between the two forms a valuable diagnostic and prognostic sign of the existence of tonic contraction. Between the two segments a groove (Fig. 1) can be felt by palpating the anterior abdominal wall, and the height of this groove above the pubes is a measure of the degree of distension and thinning of the lower uterine segment. In extreme cases the lower segment may be dilated sufficiently to accommodate the greater part of the body of the fœtus, and the groove (Bandl's ring) will rise as high or higher than the level of the umbilicus. At the same time the uterus, as a whole, becomes hard and tender, the outlines of the fœtus cannot be felt nor its heart sounds heard. It is in such conditions as these that the lower segment gives way and tears over the head or other

part of the fœtus, owing to the continuous traction exerted upon it by the upper segment, the latter being in a state of tonic contraction.

A powerfully contracting uterus may therefore tear itself asunder

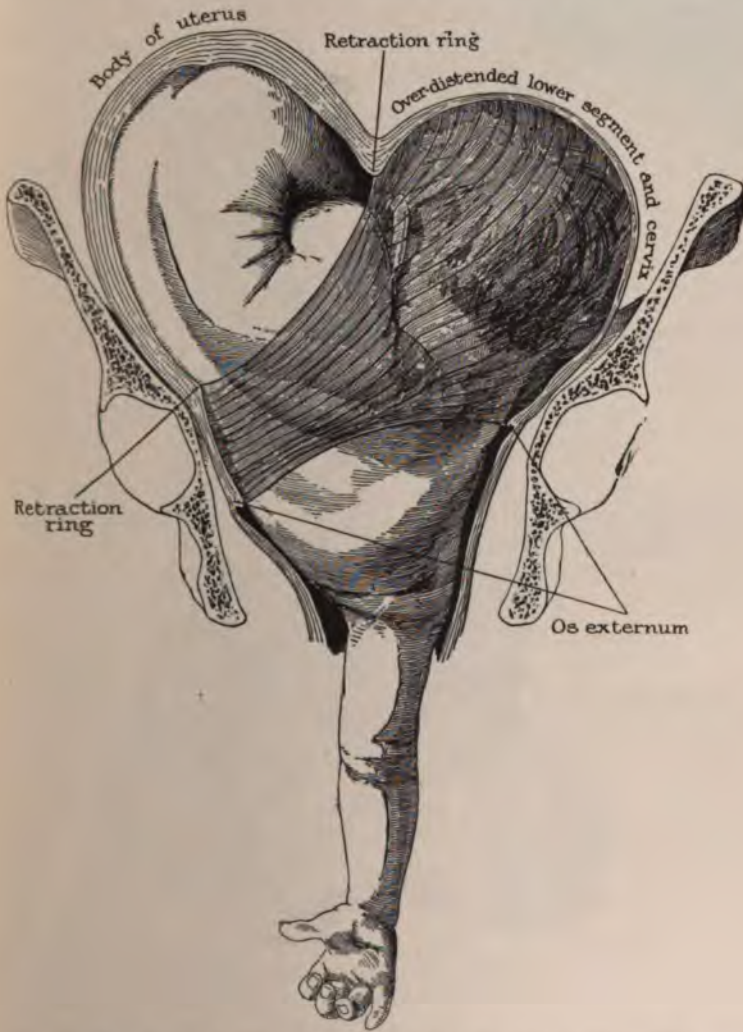


FIG. 1.—Over-distension of the lower uterine segment in transverse presentation. (Bumm.)

in the face of an obstruction which it cannot overcome. This is what is known as spontaneous rupture, in contradistinction to traumatic rupture produced by intra-uterine manipulations during labour. Lacerations of the lower uterine segment and cervix (Figs.

2 and 3) are generally the result of introducing the hand or some obstetric instrument into the uterus when it is in a state of tonic contraction. *Accouchement forcé* by means of the fingers or metallic dilators may produce this lesion. The tear generally runs

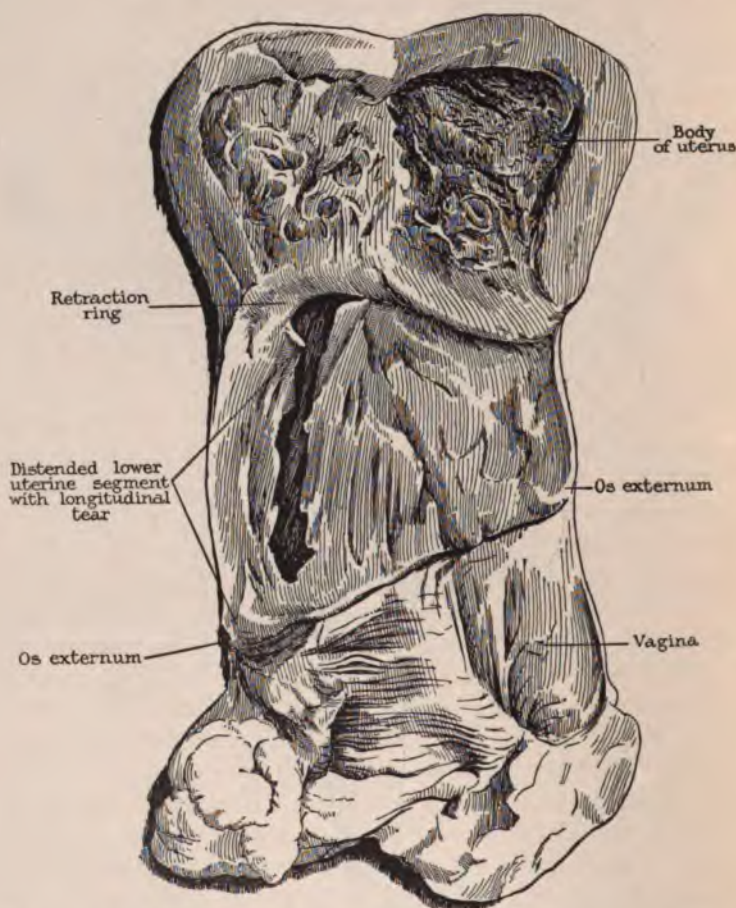


FIG. 2.—Rupture of the uterus limited to the lower segment, which is greatly distended; the distension is greater on one side than the other. (Bumm.)

up the lateral wall of the lower segment and opens up the broad ligaments. The majority of the specimens recently exhibited at the Obstetrical Society of London were of this description; the tears in a few instances reached higher up and opened the peritoneum of the broad ligament, but in several the peritoneum was intact. It is customary to speak of complete and incomplete rupture of the

uterus according to whether the rent includes the peritoneum or not, but the latter term also includes a rare variety where the peritoneal coat alone is ruptured (Fig. 4), the laceration in this case proceeding from without instead of from within. Peritoneal laceration not involving the muscularis is a lesion practically confined to the fundus, and is not the result of manipulation. Similarly

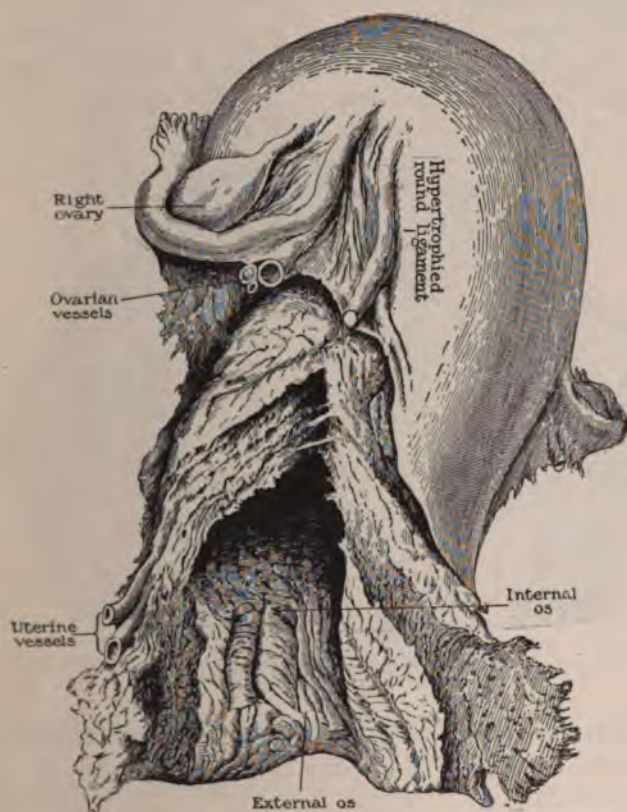


FIG. 3.—Rupture of the lateral wall of the uterus involving lower segment and cervix. (Edgar.)

Complete fundal rupture (Fig. 5) is never produced by interference during labour, but is the result of the giving way of a Cæsarean section scar during pregnancy or labour.

The treatment of rupture of the uterus is prophylactic and curative.

Prophylaxis includes a proper knowledge of the physiology of uterine action and accuracy in obstetric diagnosis, *e.g.*, the early

recognition of any disparity in size between the fœtus and the maternal pelvis, the early rectification of fœtal distocia, such as transverse and shoulder presentation, the presence of an abnormally large head, the existence of pendulous belly or extreme uterine obliquity; the detection of cervical cancer or of an obstructing pelvic fibroid, ovarian dermoid or other tumour lying in the pelvis which cannot be pushed up out of the way and is therefore an obstruction to delivery.

It also includes the timely aid by forceps in delayed labour, where, in spite of good pains, the progress of the presenting part is inadequate, or where no advance whatever is made. In such cases

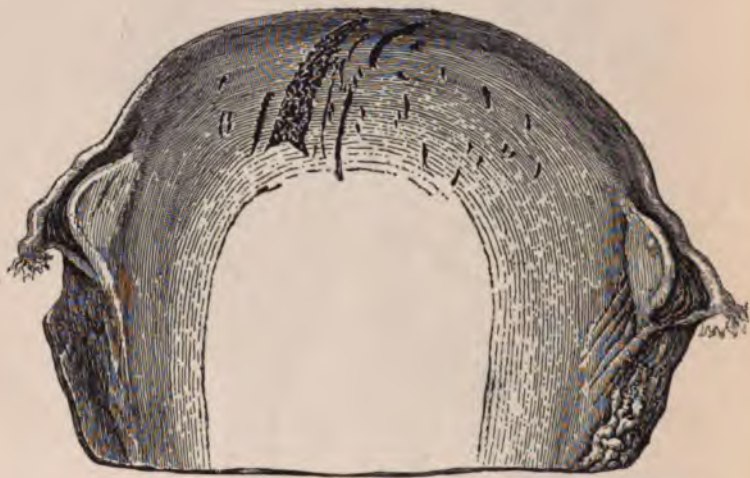


FIG. 4.—Incomplete uterine rupture involving the peritoneal coat only. (Von Winckel.)

the patient may be encouraged to bear down, as thereby the risk of rupture is lessened by diminishing the thinning of the lower uterine segment.

In 160 cases of rupture of the uterus collected by Mertz 43·6 per cent. were due to contracted pelvis, 16·2 per cent. to neglected transverse presentations, 13·1 per cent. to manipulative interference, and 11·2 per cent. to hydrocephalus.

It cannot be laid down too emphatically that it is absolutely essential to examine every woman early and late in pregnancy before labour commences in order to eliminate the above causes of tonic contraction and rupture of the uterus. The majority of cases of rupture occur in multipara; therefore careful enquiry into the history of past pregnancies should be made, the fact of a previous Cæsarean

section or of a ventri-fixation should be ascertained, for although the latter operation is now largely replaced by the safer method of ventri-suspension by means of the round ligaments, nevertheless many operators still fix the body of the uterus to the anterior abdominal wall, or to the front wall of the vagina, and this is apt to cause during pregnancy distension and thinning of the posterior wall of the uterus, which thus becomes much weaker as the gestation advances to term. The liability to rupture in these cases is enhanced



FIG. 5.—Complete transverse rupture of the fundus uteri. (Von Winckel.)

by a backward and upward displacement of the cervix, which disturbs the normal mechanism of parturition.

No woman should be allowed to run the risk of her uterus becoming tonically contracted, and this risk is only to be prevented by the attendant being fully acquainted with her obstetric condition before labour begins; therefore an early and thorough examination of each patient should always be made.

Inasmuch as 13 per cent. of the cases of rupture are due to operative procedures, it is necessary to recognise this fact under prophylaxis. In dilating the cervix for rapid delivery, as for example in eclampsia, the greatest care is necessary in carefully graduating

the force used, whether by finger or by metal dilators. Forceps should never be applied before the os is fully dilated. In turning, the hand should not be introduced into a uterus in which the liquor amnii has long escaped and the walls of which are firmly contracted down upon the fœtus. It should be remembered that when Bandl's ring has risen 2 inches above the pubes there is risk of rupture, and in such a case the presence of the hand in the lower thinned and expanded segment is enough to determine a laceration. Embryotomy must take the place of turning, and this does not mean foetal destruction, for the child will have succumbed to asphyxia as the result of tonic contraction.

Curative Treatment.—Just as prophylaxis involves a knowledge of the past history and present state of a pregnant woman, so the curative treatment involves a proper understanding of the diagnosis and morbid anatomy of rupture of the uterus in a woman in labour.

Rupture of the uterus is generally preceded by a difficult and painful labour, on which the signs and symptoms of tonic uterine contraction supervene. In the case of a sudden extensive tear, where the child has escaped into the peritoneal cavity, there is acute pain attended by severe collapse and hæmorrhage; the latter may or may not be revealed externally. The pain is unilateral and the rhythmical uterine labour-pains cease. If the presenting part is in the vagina it recedes, if above the brim it will be easily felt in the peritoneal cavity and the uterus will be smaller. In many cases the process of tearing is gradual, and the uterine pain ceases more gradually, and if the presenting part is too low in the vagina to recede there is a cessation of advance and it remains stationary. Many of these gradual cases are not diagnosed until after delivery of the patient, and it may then be found that the placenta has escaped into the peritoneal cavity, the uterus may be firmly retracted, but external hæmorrhage goes on in spite of this, the patient being meanwhile collapsed. Under such conditions an examination for the tear must be made. It may be in the upper third of the vagina or in the cervix; if so, it will be easily detected. If higher, a finger in the uterus will detect it, generally in one or other lateral wall. Should the placenta have escaped, the cord will guide the finger in its direction through the rent.

Should the uterus still contain the fœtus after rupture, delivery through the natural passages must be attempted as soon as possible by forceps, or if necessary by craniotomy. If the child has partly escaped into the peritoneal space, careful gradual extraction should be tried. If the escape thereto is complete, laparotomy and delivery through the abdomen must be carried out. When the placenta alone

has escaped through the rent, an attempt should be made to draw it gently back without injury to the intestines. When there is any difficulty in so doing, it must be removed by abdominal section; the treatment here will largely depend upon the position and size of the tear.

As regards *the treatment of the laceration itself*, if the opening into the peritoneum is small, it has frequently sufficed to plug with antiseptic gauze (subnitrate of bismuth gauze is what we recommend) with the object of arresting the hæmorrhage and securing drainage. For a large tear, however, where there will of necessity be severe internal bleeding, laparotomy should be performed, the blood clot removed, the bleeding points secured, and the tear sewn up with iodised catgut in two rows of sutures, one row including muscle down to, but missing mucosa, and a superficial row for the peritoneum. A practitioner should never omit to plug any tear before sending a case to hospital, as he can do this without assistance or special appliances; it may save a patient's life and at the worst can do no harm if ordinary cleanliness is observed. In cases of vaginal and cervical tears the attendant should suture all bleeding points within reach and bring the edges of the tear together, leaving just room enough for a drain of bismuth gauze to be inserted into the pouch of Douglas or into the broad ligament. For deep lacerations into the broad ligament the cavity should be carefully swabbed out with formalin solution ($\frac{1}{2}$ per cent.) and then firmly packed with bismuth gauze, which may be left in for forty-eight hours and then renewed.

There is great danger of septic peritonitis in cases where the child has escaped into the peritoneal cavity, and for this reason Eden suggests that the uterus be removed by vaginal hysterectomy forty-eight hours after the accident if the patient rallies, since, as he points out, the heavy mortality is largely due to sepsis and not to shock or hæmorrhage.

Cases of repeated rupture have been recorded, and for this reason some operators advise abdominal hysterectomy for very large tears and after removal of the child from the peritoneal cavity. It should here be remembered that such a procedure adds far more to the shock, which is already often extreme, than the alternative plan of suturing the rent. In well chosen cases, where the patient rallies after the saline infusion, abdominal hysterectomy following removal of the foetus from the abdomen will have the advantage of minimising sepsis and preventing a repetition of rupture of the uterus.

The writer recognises that much of the advice here given can only be carried out under favourable conditions, such as obtain in a hospital, but gauze packing and saline infusion by the rectum or

ing the axillary fold into the axilla should be employed by the general practitioner, and by these simple means lives may be saved.

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TONIC CONTRACTION OF THE UTERUS.

THIS means that the contractions of the uterus have become more and more violent and closer and closer to one another in point of time, until they seem to be merged in one continuous pain. To the superficial observer it may appear as if the pains had ceased as in uterine exhaustion, but with ordinary care this fatal mistake should never be made. The clinical differences between the conditions are pointed out in the article on Uterine Exhaustion. Tonic contraction exhausts the mother without advancing labour and kills the child by obstructing the placental circulation. It occurs most commonly as the result of some obstruction, which a strongly acting uterus cannot overcome, but it may also be brought on by the administration of ergot or by repeated unsuccessful attempts at delivery, and is perhaps more readily induced when infection of the uterine cavity has occurred. Hence it is found almost exclusively in the second stage of labour and is nearly always the result of mismanagement.

The treatment consists in the first place of a hypodermic injection of morphia ($\frac{1}{3}$ to $\frac{1}{2}$ gr.), followed by the administration of chloroform to the full surgical degree. In most cases this will relax the uterus, but when ergot has been given it may fail to do so. When relaxation has occurred, delivery must be effected, in doing which the life of the child may be disregarded, since it is almost certainly dead. Delivery should not be attempted before the morphia and chloroform have had time to produce their full effect, or the tonic contraction may recur.

Tonic contraction is often accompanied by over-distension of the lower uterine segment, when this segment becomes much thinned and the retraction ring can be felt as an oblique groove between the thinned lower segment and the thickened upper segment of the uterus some distance above the symphysis pubis. In many cases, also, the strongly contracted and thickened round ligaments can be felt. Under these circumstances the retraction ring may cause difficulty in delivery by gripping the child some distance above the presenting part, for instance at the neck when the head is presenting. To effect delivery the head may have to be decapitated by scissors and the body extracted by internal version, but the very greatest care must be taken not to rupture the lower uterine

segment, and rather than use any force the body had better be delivered piecemeal.

In the third stage of labour the practitioner must be prepared to treat post-partum hæmorrhage, and if there is any suspicion that the uterus has been ruptured, a careful examination of its interior must be made with the sterilised hand and the necessary treatment adopted (*see* Rupture of Uterus). A condition which is closely allied to tonic contraction, namely hour-glass contraction, may occur in the third stage. In this the upper uterine segment is tonically contracted, including the retraction ring. Above the latter the placenta is retained and will need to be removed manually. This can sometimes only be done under anæsthesia.

G. F. DARWALL SMITH.

UTERINE EXHAUSTION.

EXHAUSTION of the uterus, or as it is sometimes called "secondary uterine inertia," means that the uterus has become tired out. This may happen to a uterus which is already inert, or to a strongly acting uterus which meets with a resistance that it cannot overcome. Far more often, however, the strongly acting uterus passes into a condition of tonic contraction, a condition which may be mistaken for uterine exhaustion, but has to be very carefully distinguished from it, since the treatment of the two conditions is totally different (*see* Tonic Contraction). In both there is an apparent absence of uterine pains, but in exhaustion the uterus is lax, not tender, and the foetal parts are easy to feel, whereas in tonic contraction it is firm and tender to the touch, and the foetal parts cannot be made out. In exhaustion, too, the presenting part can be easily pushed upwards, and there is not necessarily a caput succedaneum of any size, as contrasted with the fixation of the presenting part and the large caput in cases of tonic contraction. Moreover, the general condition of the patient in these two conditions is quite different. In exhaustion the woman is tired, but otherwise her general condition is fairly good, and her pulse, respiration, and temperature are but little disturbed; in tonic contraction she is anxious, distressed and restless, her tongue is coated and dry, her vulva and vagina are dry, hot, and in many cases swollen, her pulse and respirations are rapid and increasing in rate, and her temperature is raised.

Uterine exhaustion is a condition which should never be allowed to become pronounced. The treatment is comparatively simple. It may almost be summed up in the word "rest." Of course any minor cause of obstruction should be dealt with, such as a full bladder or rectum by catheter or enema, or deviations of the uterine axis by the use of the binder and, if necessary, of pads, but no attempt whatever must be made to deliver the woman in the presence of exhaustion, neither by oxytocic drugs nor by mechanical stimulation of the uterus nor by the use of any instrument, such as the forceps. If the patient cannot sleep unaided, she may be given an injection of morphia ($\frac{1}{4}$ to $\frac{1}{2}$ gr.) or 30 to 40 min. [U.S.P., 18 to 24 min.] of tincture of opium by mouth or rectum. Only after the uterus has regained its power of contraction by rest should any attempt be made to effect delivery.

If an inert uterus shows signs of commencing exhaustion, it is good treatment to deliver with the forceps, provided that the cervix is fully dilated, but if exhaustion is once established, no attempt at delivery must be made until the exhaustion has passed off. When exhaustion has passed off and it has been decided to deliver the woman, any major cause of obstruction which may have caused the exhaustion will of course have to be treated (*see Contracted Pelvis, etc.*).

If the exhaustion has been pronounced, it is perhaps permissible at the end of the second stage to give an intra-muscular injection of 30 or 40 min. of liquid extract of ergot, or, better still, the contents of a bulb of Parke Davis' aseptic ergot.

Exhaustion, if persistent in the third stage of labour, causes post-partum hæmorrhage and must be treated accordingly (*see Post-partum Hæmorrhage, p. 214*).

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UTERINE INERTIA.

THE term "inertia" is here used of those cases in which the uterus is acting feebly from the beginning of labour. This condition is also called "primary uterine inertia," and has to be clearly distinguished from uterine exhaustion, which is often called "secondary uterine inertia."

In cases where there is a history of inertia in previous labours the same condition is quite likely to recur in subsequent labours. In such cases this troublesome condition may apparently be prevented sometimes by the administration of quinine and strychnine during the last few weeks of pregnancy. These drugs may be conveniently given in the form of Easton's syrup, beginning with $\frac{1}{2}$ drachm doses four weeks before the expected date of the confinement and increasing the dose to 1 drachm a fortnight later. This precaution should certainly be adopted in cases where there has previously been not only inertia but post-partum hæmorrhage or severe after-pains, and indeed is a harmless precaution even in primigravideæ. The treatment of inertia during labour depends partly on the stage of labour, partly on the condition of the mother and of the ovum, and partly on the cause producing the inertia.

In the first stage of labour, so long as the membranes are intact, there is, as a rule, no reason for anxiety about mother or child. The labour is tedious, but since the pains are weak, the mother does not really become exhausted and the child does not suffer from pressure. Any discoverable cause for inertia should of course be treated. A full bladder or rectum should be emptied; adherent membranes should be separated by passing the finger into the cervix as far as the second joint and sweeping it round in the neighbourhood of the internal os. If the inertia is associated with hydramnios or accidental hæmorrhage, these conditions should receive their appropriate treatment (*see* Hydramnios and Accidental Hæmorrhage). If the bag of forewaters is unduly small, the presenting part may be pushed upwards in the intervals between the pains so as to allow more liquor amnii to descend into the bag. If the inertia seems to be due to general debility, give the patient small quantities of easily assimilable food every two hours and encourage her to sleep, if she can, in the intervals between the pains. If it seems wise to delay labour while the patient rests,

opium is the best drug to use in most cases in the form of the tincture or nepenthe, and in a dose of 20 or 30 min. [U.S.P., tinct. opii, 12 to 18 min.]. Where the patient's general condition is good, walking about during the first stage of labour sometimes has a good effect upon the pains. In any case the patient should at least sit in a chair or be propped up in the dorsal position in bed. Hot drinks, hot baths and hot douches (*e.g.*, lysol, 2 drachms to 2 quarts of boiled water at 115° F.) all do good in some cases.

Quinine is a drug which has a remarkable effect in some cases, though in others no effect whatever seems to follow its use. It may be given in doses of 5 to 10 gr. every three hours (*e.g.*, Quin. Sulph., gr. 5; Acid. Sulph. Dil., $\text{m}10$; Syrup. Aromat., zj ; Inf. Calumb., ad zj) [U.S.P., R. Quin. Sulph., gr. 5; Acid Sulph. Dil. $\text{m}10$; Tinct. Aurantii. Amar., $\text{m}15$; Aq. Cinnam., $\text{m}15$; Syrupi, zss ; Inf. Calumbæ, ad zj]. As mentioned above, it is unnecessary to use it in the first stage of labour in most cases, and on one occasion the writer has seen it produce pains of alarming intensity with a cervix only slightly dilated. If it is vomited when given by the mouth, a rectal suppository containing 15 gr. of the bisulphate may be used, or strychnine ($\frac{1}{30}$ gr.) may be given hypodermically and repeated as necessary.

In those cases where the contractions of the uterus are irregular, cramplike, very painful and ineffective, a hypodermic injection of morphia ($\frac{1}{4}$ gr.) often does great good; or a rectal injection of chloral (20 gr. in 4 oz. of warm milk), repeated in an hour if necessary. Inhalation of chloroform, or even better of a mixture of 2 parts of chloroform and 3 parts of ether, is also effective.

When the membranes have ruptured early in the first stage, a lengthy first stage, even in the absence of pains strong enough and numerous enough to tax the patient's strength appreciably, cannot be regarded with the same degree of equanimity as described above. In such cases not only may the child suffer from the effects of prolonged pressure, but the danger of intra-partum infection is greatly increased, probably from the growth of bacteria up to the thin layer of fluid extending into the interior of the uterus. Hence measures must be taken to complete the first stage of labour within a reasonable time. The best method of doing this is to use Champetier de Ribes' bag as a substitute for the ruptured bag of membranes. If this instrument is not at hand, the cervix may be carefully dilated with the fingers (*see* Dilatation of Cervix).

In the second stage of labour help is almost always necessary in any well-marked case of inertia, in the interest of the child if not of the mother. Danger to the child is shown by persistent slowing of

the foetal heart-rate between the pains (the normal rate being from 120 to 160). Great attention must be paid to this in all cases of prolonged labour where the membranes are ruptured. Other signs of foetal distress are the passage of meconium and convulsive movements.

Help is needed for the sake of the mother if her pulse rises above 100 in the intervals between the pains, and apart from this it is not wise, generally speaking, to allow the second stage of labour to last longer than four hours in a primipara or two hours in a multipara.

The course of labour may be hastened by methods applied either outside or inside the birth canal, and the external methods should always be tried before resorting to internal methods, unless the condition of mother or child is such as to brook of no delay.

The patient should be kept in the dorsal position, somewhat propped up in bed, until the presenting part is at the vulva, and if there is any tendency to pendulous belly a binder should be firmly applied. The patient should be encouraged and shown how to bear down effectively during her pains. In most cases chloroform should be withheld as much as possible, but in the case of very nervous women a little chloroform during the pains sometimes does good. Quinine or strychnine may be given as described above, but at intervals of one hour instead of three hours, and massage and pressure may be applied to the uterus during the pains or even to excite pains at regular intervals.

If the above methods do not produce the desired result, the forceps must be applied when the head presents, or a leg brought down and traction made on the breech in the case of a podalic lie. One of these two things should always be done if the mother's pulse rises above 100 in the intervals between the pains or if the foetal heart is slowing, but the forceps must never be used unless the cervix is enough dilated to allow the head to be extracted without tearing the cervix.

In the third stage of labour the medical man must be prepared to treat post-partum hæmorrhage and must have everything ready for that purpose (*see* Post-partum Hæmorrhage). If manual removal of the placenta is necessary, though the third stage should on no account be hurried unless there is undue hæmorrhage, the contents of a bulb of Parke Davis & Co.'s aseptic ergot may be injected into the muscles of the buttock immediately before the hand is inserted into the uterus, and a hot intra-uterine douche (lysol, 2 drachms, to boiled water, 2 quarts, at 118° F.) given immediately afterwards.

The above account is confined strictly to the treatment of inertia,

but the medical man should ever keep a watchful eye for other causes of delay in labour, which not infrequently complicate inertia. The inert uterus is easily exhausted and help should be given before this occurs, but if exhaustion supervenes, it must be treated before the foregoing measures are adopted (*see Uterine Exhaustion*, p. 250).

G. F. DARWALL SMITH.

THE MANAGEMENT OF THE NORMAL PUERPERIUM.

THE term "puerperium" is applied to the period occupied by the return of the pelvic organs to their normal condition in the non-gravid state. Since the uterus, the most important of these organs, takes six weeks to involute, we may say that the puerperium, strictly speaking, lasts six weeks. The puerperium must not be confused, as it so often is, with the "period of convalescence" or "lying-in period," the period during which a woman remains in bed after her confinement and is more or less an invalid: the period of convalescence lasts two or three weeks, according to circumstances, and it is with the management of a patient during this period that the present article deals.

To begin with, we must try to realise the profound changes, mental, anatomical and physiological, that have occurred in a newly-delivered woman. For months she has been conscious of the presence of her child, has felt its movements and has anticipated, usually with dread, its arrival. By its birth she is freed from a parasite, which has derived its nourishment from her and has cast its excretory products into her circulation. Other important changes have occurred: the mental and physical strain of labour has been great: there has been a sudden fall in the intra-abdominal pressure: the amount of blood circulating through the uterus is much diminished and a large vascular area, the utero-placental circulation, has disappeared: there has been an appreciable loss of blood, and the soft structures of the birth canal have been stretched, bruised and often lacerated. Finally, there are profound changes in metabolism associated with the involution of the uterus and the establishment of lactation.

The puerperium is not an illness, but a period of physiological recovery and rest. Yet it borders closely on the pathological. To a hardy woman of the working class, and still more to the primitive savage, labour causes but little inconvenience; but to a sensitive and highly civilised woman, labour is a serious event, and the puerperium is seldom traversed without at least a minor disturbance of some kind.

ANATOMY AND PHYSIOLOGY.

These will be considered sufficiently for practical purposes only.

The Uterus.—After the termination of labour the top of the fundus of the uterus lies at the level of the umbilicus: it feels hard or soft according to whether it is contracted or relaxed, for rhythmic contractions and relaxations continue, and may be felt, objectively by the examiner's hand, and sometimes subjectively by the patient (after-pains), throughout the early days of the puerperium.

The uterus now undergoes the remarkable process known as involution. This process goes on rapidly during the first ten days of the puerperium, after which it becomes slower. Immediately after labour the top of the fundus lies 6 inches above the symphysis pubis; at the end of ten days it should lie just behind it. Involution, after this, goes on more gradually, and is completed at the end of six weeks. Attention to the rate of involution is important.

Simultaneously with decrease in size of the uterus, regeneration of the endometrium takes place. The remains of the decidua vera become necrotic and are cast off in the lochial discharge: a new endometrium is gradually formed from the remnants of the glands.

Vagina and Pelvic Organs.—The vagina, at the end of labour, forms a wide, smooth-walled tube, with lax walls. The lumen of the vagina rapidly contracts and, in two or three days, the rugæ are again well marked. The ovaries, whose function of ovulation has been in abeyance during pregnancy, again begin to bring to maturity and to discharge ova. The establishment of menstruation varies considerably; in women who suckle their children the onset of the first period may be delayed from six to nine months, but in those who do not, it may appear within six weeks of labour and is apt to be profuse, a likelihood about which the patient must be warned. In spite of the absence of menstruation, ovulation occurs regularly, and conception may occur within a few weeks of labour.

The Lochia.—The lochia is the discharge which comes from the interior of the uterus during the first few days of the puerperium. For three or four days it is bright red in colour and consists of pure blood mixed with degenerated decidual cells and leucocytes. After this it becomes brown, and contains less blood. The brown colour gradually fades, becoming pink, then yellow, and finally colourless. The lochial discharge should cease at the end of ten days. The lochia has a characteristic odour, which must be known, in order to appreciate whether or no the lochia is "offensive" in odour, an important sign of sapræmic decomposition. The lochia, as it leaves the uterus, is free from bacteria, but in the vagina it becomes

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contaminated with a variety of organisms. The amount of the lochia varies considerably, but the average amount is about 20 oz.

The Urine.—The amount of urine passed during the early days of the puerperium is in excess of the normal. Traces of albumin are not uncommonly found in the urine during the first twenty-four hours after delivery, no doubt due to the strain of labour, for its presence is more common after severe labours. Traces of lactose are also sometimes found.

The Blood.—There is a slight diminution in the number of red corpuscles and hæmoglobin, which varies with the amount of blood lost during the third stage of labour, and which is recovered from in a few days. There is an increase in the number of white corpuscles immediately after labour, over and above the increase always associated with pregnancy. This point must be remembered when a blood count is being made for diagnostic purposes.

The Breasts.—The secretion of milk usually commences during the third day of the puerperium. There are, however, individual variations: in primiparæ the milk may not appear until the fourth or fifth day, and in multiparæ it may be present as early as the second day. During the first two days the breasts show no change; they continue to secrete colostrum, though in increased amount. Colostrum is a turbid, yellowish fluid, richer in albumin and much poorer in fat and casein than milk. Examined under the microscope it is seen to contain many colostrum corpuscles; these are large, round cells crammed with small fat globules. The amount of colostrum secreted by either breast during the twenty-four hours does not exceed 1 drachm.

The secretory activity of the breasts commences somewhat suddenly, and is accompanied by marked hyperæmia. The breasts swell, become firm, and throb painfully; on palpation they feel hard, knotty and tender; the superficial veins become more prominent. Occasionally, from extension of breast tissue into the axillæ, tender tumours make their appearance in this situation. The milk, at first, does not flow freely, owing to the general engorgement of the breast and the swelling of the epithelium lining the lactiferous ducts. Gradually the milk flows more freely, and the breasts become less engorged and more comfortable. The initial secretion of milk often causes slight constitutional disturbances, accompanied by headache and a transient rise of temperature.

Once established, the continuous secretion of milk is influenced very largely by the sucking of the infant. This influence is both mechanical from the sucking action, and psychical from the presence of the infant at the breast. It is not purely mechanical, for if

instead of the infant sucking, the breast is regularly exhausted by a breast-pump, the secretion diminishes and finally ceases. It is not purely psychical, for if the infant sucks through the teat of a glass nipple-shield, the same thing will happen.

DETAILS OF MANAGEMENT.

Knowing what is normal, and promptly recognising and efficiently treating what is abnormal, constitutes the successful management of the lying-in woman. Few practitioners know what a large proportion of pelvic disease is consequent on child-birth. These "post-parturient diseases" often manifest themselves first during the lying-in period, and if recognised at this time, can be successfully treated.

The treatment of the patient consists in observing carefully that the involution of the uterus is proceeding normally, and that the quantity and character of the lochia are as they should be, in preserving strict cleanliness, in watching the condition of the breasts, in regulating the diet and the functions of excretion, and in confining her to bed. She should be visited daily for the first five days, and afterwards at longer intervals; she should be kept under observation for three weeks or a month, at the end of which time a thorough examination of the pelvic organs should be made.

The first few hours after labour are usually occupied by the patient in sleeping. The nurse should, however, be instructed to watch her carefully, for two dangers, though remote, are still to be reckoned with—hæmorrhage and delayed shock. Tell the nurse to observe the patient's colour from time to time, to count the pulse, to examine the pad, and to feel the uterus. After she has wakened from her sleep and it has been ascertained that the uterus is well retracted and the lochia not excessive in amount, the binder is applied. The baby should now be put to the breast for the first time.

There are many varieties of binder, from a simple broad band of huckaback or linen secured by safety-pins in front, to a more elaborate arrangement fastened by straps and buckles. Provided that it is made of a soft material which does not irritate the skin and which in hot weather is not too heavy, it does not matter what form it takes, so long as it fits the figure closely and extends from just below the hips to beneath the axillæ. The binder is reputed to aid in preserving the figure; its usefulness in this respect is extremely doubtful, as it is more likely to interfere with the tonicity of the abdominal muscles than otherwise. At all events, it tends to counteract the great fall in intra-abdominal pressure which follows the birth of the child, and

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adds considerably to the comfort of the patient; further, if her figure does not regain its former shape, she will never forgive the doctor who forbade the use of the binder.

Removal of Discharges and Cleanliness of the Vulva.—

Bearing in mind that the interior of the uterus is an open wound, easily infected, it is of great importance to protect it from the entrance of bacteria. The vulva is the portal of infection to the uterus and abounds with bacteria. Further, the lower portion of the vagina in lying-in women is not bacterium-free, and the lochial discharge lying in the vagina and flowing over the vulva is an admirable culture medium. The principles to be adopted for the protection of the patient against uterine infection are: (1) to remove bacteria, as far as is possible, from the vulva and its neighbourhood; (2) to ensure the free exit of the lochial discharge.

The vulva cannot be rendered bacterium-free, but the number of bacteria can be materially diminished. The vulva and its neighbourhood must be sponged morning and evening, and every time the bowels act and the urine is passed, with an antiseptic lotion such as lysol (1 drachm to 1 pint), or perchloride or biniodide of mercury (1 in 4,000): cotton-wool swabs are best for this purpose, as they can be sterilised before use and thrown away afterwards. The vulva must be covered with a pad composed of some material which absorbs discharges readily, such as absorbent wool wrapped in gauze; before use, it should be sterilised by baking in an oven. A piece of antiseptic gauze should be placed on the vulval surface of the pad, so that the multiplication of bacteria on the surface in contact with the vulva may be inhibited. The pads must not be left on long enough to allow decomposition on them of the lochial discharge. When the discharge is free, they should be changed every four hours. Much may be done by the posture of the patient to facilitate the escape of the discharge. When the patient lies constantly in the dorsal position, the discharge collects in a pool in the vagina; this position should not be rigidly adhered to. A lying-in woman may lie in any position she chooses, and in fact, should be encouraged to lie on her side or in the semi-prone position. She may be sat up twice a day for a few minutes to allow the discharge to drain.

The points to be investigated at each visit during the lying-in time, and more especially during the first week, are: (1) The temperature; (2) the pulse; (3) the involution of the uterus; (4) the lochia; (5) sleep; (6) pain; (7) the passage of urine; (8) the bowels; (9) the breasts; (10) the diet.

The Temperature.—Immediately after labour there is often a transient rise of temperature. This is the "temperature of reaction," and occurs in about 50 per cent. of cases. It is analogous to a post-operative rise of temperature, and need cause no anxiety. The temperature of a lying-in woman is subject to transient rises from such causes as engorged and painful breasts, excitement, or gastro-intestinal disturbances. But it cannot be sufficiently emphasised that, in the majority of cases, a rise of temperature is due to some form of septic infection. It is very easy to console ourselves that a rise of temperature is due to some trivial cause, such as engorged breasts or constipation: in many cases these transient rises can be attributed to a more definite cause, and inspection may reveal a small tear of the vagina or vulva with a sloughy surface. We are never justified in attributing a rise of temperature to other causes, unless sepsis, even the slightest form, can be excluded.

The Pulse.—After a severe labour or after undue hæmorrhage the pulse is often for a time rapid, but it soon returns to the normal. The pulse is on the average slower than at other times, especially during the first two or three days, and occasionally may be unusually slow, falling to fifty or even forty beats per minute. This is sometimes referred to as "puerperal bradycardia," and is perhaps to be accounted for partly by the horizontal position of the patient, and partly because the heart, always hypertrophied during pregnancy, has no longer to pump blood through the large vascular area of the utero-placental circulation. The pulse is subject to transient acceleration from minor causes, but this is of no importance when unaccompanied by a rise in temperature. A rapid pulse with a subnormal temperature indicates hæmorrhage; a rapid pulse with a high temperature indicates sepsis.

Involution of the Uterus.—It is important to follow the rate of involution of the uterus. A diminished rate is associated with certain pathological conditions, of which it may be the first indication. A uterus which involutes slowly may remain in a permanent state of sub-involution, or may become retroflexed, both of which conditions may with care be prevented.

The height of the fundus uteri above the symphysis pubis may be measured day by day. On the day following delivery the measurement equals 5 or 6 inches, and should diminish one-half to two-thirds of an inch daily. Before taking the measurement be sure the bladder is empty: a distended bladder displaces the uterus upwards. It is not uncommon to find that, on the day after delivery, the fundus is raised 8 or 9 inches above the symphysis and

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lies near the costal margin, generally to the right of the middle line. Such a condition may cause alarm to the unwary, but the distended bladder may be easily felt as an elastic swelling above the symphysis, and its outline is often visible.

The rate of involution varies considerably. It is always more rapid during the first four or five days after delivery than later. It is usually less rapid in multiparæ, and in those who do not suckle their infants. Any marked delay or arrest of involution should always be regarded with suspicion, and its cause sought for and removed. The presence of portions of placenta, blood clot or membranes within the uterus is the most common cause, and as this event is almost invariably accompanied by excessive lochial discharge and painful uterine contractions, its diagnosis is usually easy. Delay or arrest of involution always accompanies sapræmia. Fibromyomata, if present, will naturally cause a considerable increase in size of the puerperal uterus.

For the sake of clearness it is well to make an "involution curve" on the temperature chart—making the 100° F. line represent zero, and every degree above that equal to 1 inch. Delay or arrest of involution calls for treatment, and we must excite the uterus to contract, for there is no doubt that involution is favoured by an efficiently contracted uterus; further, active contractions serve to expel the retained material which may be at the root of the mischief. To accomplish this we depend on ergot and hot vaginal douches, combined with massage of the uterus. The ergot is best combined with strychnine: *R. Extracti Ergotæ Liquidī, ʒj; Liquoris Strychninæ, ʒv; Aquam, ad ʒj.* [U.S.P. *R. Fluidextracti Ergotæ, ʒj; Strychninæ Hydrochloridi, gr. ʒ½; Aquam, ad ʒj.*] To be taken every four hours.

A very pleasant preparation of ergot is Ernutin (Parke Davis & Co.), sold in 1-oz. bottles. It is tasteless and colourless, and the dose is 1 drachm.

The Lochia.—The characteristics of the lochial discharge have already been referred to. The lochia, within certain limits, varies much in amount, character and duration. There are some women in whom the lochial discharge is almost negligible in quantity. There are others in whom the early red lochia is very profuse, and it is said that women who are accustomed to profuse menstrual periods are especially subject to profuse lochial discharge. There are others in whom the lochia remains bright red in colour for a week or two, instead of for the prescribed four days. And yet there may be no pathological condition; they are "normal cases," in spite of vagaries in the lochial discharge. Nevertheless,

though we may recognise the above variations, it is safest first to look upon them with suspicion, and only to regard them as physiological when the presence of a pathological cause has been excluded. The lochia must be considered as to (1) the amount, (2) the colour, (3) the odour, (4) the presence of clots or pieces of membrane, and (5) the duration.

The best index of the amount is the number of pads used daily. A careful doctor will direct the nurse to keep for his inspection the pads used during the preceding twenty-four hours, and a little practice will soon enable him to gauge whether the amount of discharge is excessive or not. The amount must naturally be estimated not only by the number of pads, but by the degree to which they are soaked.

An excessive amount of discharge often means that something—blood clots, pieces of membrane or placenta—has been retained in the uterus. If this is associated with a bulky uterus and after-pains, such an explanation becomes almost certain and calls for treatment with ergot and hot vaginal douches to expel the offending tissue. Blood clots are often passed during the first two or three days of the puerperium. They may come either from the interior of the uterus or from the vagina; if from the former, they preserve more or less the shape of the cavity of the uterus and are thick, wedge-shaped, and rough on the surface from contact with the roughened decidual surface which lines the uterus; if from the latter, they are flattened in shape and smooth.

If the red colour persists, although not increased in amount, the involution of the uterus is probably not progressing as rapidly as it should; confirmation of this is sought in the daily measurements of the uterus, and, if found, treatment by ergot and hot douches must be instituted.

If the red colour returns after the discharge has been for several days colourless, suspect backward displacement of the uterus. The importance of this diagnostic sign cannot be too highly emphasised. Remember that about 75 per cent. of all retroflexions arise *de novo* in the puerperium, and much more commonly in primiparæ than in multiparæ. Their time of origin is from the eighth to the fourteenth day, coinciding with the time in which the diminution in size of the uterus has allowed the fundus to clear the promontory of the sacrum. The only immediate symptom of puerperal retroflexion is a *return of the red lochia*, and sometimes even this is absent; in all cases in which it occurs make a vaginal examination. If retroflexion of the uterus is thus discovered at once, its treatment is simple and successful.

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Marked diminution or even cessation of the discharge often accompanies severe general infections.

In saprophytic decomposition of matter retained within the uterus, the discharge is yellowish-red and profuse, from admixture with pus.

An offensive odour means saprophytic decomposition, but does not always mean decomposition within the uterus. The lochia may be odourless as it leaves the uterus and become offensive in the vagina, from contamination with sloughy surfaces, tears in the vagina or perineum; or it may even decompose in the vagina from too long retention there and contamination with vaginal bacteria. Offensive lochia is not always accompanied by a rise in temperature. In testing the odour of the lochia, always use the pad the patient is wearing at the time, for the discharge may decompose on the pad if the latter is kept for some time after removal. When the patient first gets up, the lochia often becomes red for a few hours.

Sleep.—Labour is usually followed by a few hours' refreshing sleep, after which the baby should be put to the breast and the binder applied. The patient should have at least six hours' sleep every night. If the baby is breast-fed, the feeds should be arranged to allow of this. For example, the last feed may be given at 11 p.m., and the patient wakened at 5 a.m. to give the next feed. It is not always possible to attain this ideal, for the baby may cry persistently in the night and demand a feed. But it is not good for the mother to be disturbed, and, for her sake, the baby should be trained accordingly.

Sleeplessness may be due to: (1) Disturbance by the baby: the proper arrangement is for the nurse and baby to occupy a separate room from the mother; but if they occupy the same room, and the mother is persistently disturbed by the baby, no time should be lost in making other arrangements: (2) Pain: (3) Worry: (4) Puerperal insanity; never forget that persistent sleeplessness may be the first sign of puerperal insanity.

Treatment of Sleeplessness.—Remove any obvious cause, and, if the patient cannot sleep, give an hypnotic, of which the best for this purpose are: Chloralamide (gr. 30), dissolved in a little brandy; trional (gr. 20); syrup of chloral (1 to 2 drachms).

Pain.—During the first three or four days after labour, a patient may suffer pain from various causes. It is essential to relieve a lying-in woman of pain, for it induces sleeplessness and worry at a time when it is essential for her to be free from both. The chief causes of pain are:

(1) Bruising and swelling of the vulva and perineum. The

pain is in the region of the vulva and is worst on the day following labour. It is best relieved by sponging the parts with hot lotion or by applying hot fomentations. Persistent throbbing pain in a perineum which has been lacerated and sutured demands attention, for it may indicate suppuration. Inspection of the perineum will settle this point; if it is red, swollen, and tender, apply hot fomentations, and, if necessary, relieve tension by separating the edges with a pair of sinus forceps or even by removing a stitch.

(2) A distended bladder, which is met with most commonly during the first twenty-four hours following labour.

(3) Intestinal colic. This may occur on the second or third day, following the administration of the purgative.

(4) The breasts. These are often painful on the third day, as a result of the engorgement accompanying the establishment of lactation. The treatment will be discussed under the appropriate heading.

(5) After-pains. The contractions of the puerperal uterus are usually imperceptible. Sometimes, however, during the first two or three days the contractions are painful, and are then known as "after-pains." The administration after labour of ergot or some similar preparation often produces painful contractions. After-pains are common in multiparæ but unusual in primiparæ. They are usually excited by the presence within the uterus of blood clots or fragments of placenta or membrane. There are, however, after-pains for which no such mechanical exciting cause exists; they are met with in women who suffer from spasmodic dysmenorrhœa, and the pain is often intense. After-pains are felt in the hypogastric and sacral regions, and sometimes the pain may radiate down the front of the thighs. They are often accompanied by a feeling of faintness.

For the immediate relief of pain, the following mixture may be relied on: R. Antipyrine, gr. 10; Spiritus Ammonie Aromatici, ℥20; Olei Cajuputi, ℥2; Aquam, ad ʒj. Dose, two tablespoonfuls.

At the same time, if the painful contractions are due to the retention of something within the uterus, treatment must be directed to exciting the uterus to still further expulsive efforts. Administer full doses of ergot, give a hot vaginal douche, and massage the uterus. A copious warm rectal enema is also of great assistance.

The Passage of Urine.—The patient usually passes urine within twelve hours of labour, but sometimes she finds great difficulty in emptying the bladder. The chief factors which

contribute to this are : (a) Her unaccustomed horizontal position (b) bruising and swelling of the urethra ; and (c) the great fall in intra-abdominal pressure and the atonic state of the abdominal muscles. The bladder should never be allowed to become unduly distended, for, in addition to the discomfort it causes overdistension of the bladder certainly predisposes to cystitis, and cystitis occurs very readily in a lying-in woman. The amount of distension is to be gauged by palpation ; it is not safe to trust to the patient's own feelings, for although it usually causes discomfort, great distension may occur without her being aware of it. If she cannot pass urine, various devices should be resorted to before using the catheter. She should be allowed to sit upon the bed-pan or to turn on her hands and knees ; warm fomentations should be applied over the bladder, and warm lotion be allowed to trickle over the vulva ; often a warm rectal enema produces the required result. Should these devices fail, a catheter should be passed with the utmost aseptic precautions.

The Bowels.—Unless the bowels have acted naturally, which is unusual, a purgative should be given on the second day after delivery. For this purpose nothing is better than castor oil, given in the early morning, followed, if necessary, by an enema. If the patient objects to castor oil, give her a colocynth and hyoseyamus pill, cascara, senna, or liquorice powder. A daily evacuation should be subsequently secured, and, as there is always a tendency to constipation, a mild aperient should be given regularly. A transient rise of temperature is sometimes noted after the administration of the purgative, especially when there has been great faecal accumulation.

The Care of the Breasts and Breast-feeding.—Every woman should be encouraged to feed her infant, unless there are definite contra-indications. At the present day the number of women who will not make the necessary sacrifice is remarkably small : in fact, in all grades of society there has occurred a revolution of feeling, as it were, in favour of breast-feeding, due no doubt to increased knowledge of the laws of health. But modern mothers, taken as a whole, make bad nurses, and in many cases insufficient milk supply or badly formed nipples make them unsuccessful. To those few who refuse to nurse, the physician has not completely fulfilled his duty unless he has pointed out to them how important it is, both for the sake of their infants and themselves, to nurse for at least the first four or six weeks. The infant is ensured a good start in life, and the mother is more likely to have a well-involved uterus.

Throughout pregnancy the patient should have attended to her nipples to ensure that they are in a suitable state for the subsequent feeding of the child. If flat and deformed, they should be daily drawn out with the finger and thumb; they should be kept clean and free from dried secretion, which tends to form crusts and leave the underlying epithelium soft and macerated; they should be hardened by bathing them daily with a mixture of equal parts of brandy or eau de Cologne and water. After the birth of the child an attentive nurse, by following the same routine, can still do much before the regular breast-feeding begins. When the active secretion of milk begins, a breast binder adds greatly to the patient's comfort. This consists of a broad band, such as a folded towel, placed around the thorax and secured in front by a row of safety pins, to support the breasts and to prevent them from dragging. The breasts should be washed once a day with soap and water, but the nipples should be avoided.

The mother must be instructed in the proper way of nursing. When nursing from the left breast she should lie on the left side, when from the right breast, on the right side. The child should be held by the arm of the side on which she is lying; with the other hand she should support the breast, allowing the nipple to protrude between the index and middle fingers, and preventing the breast from pressing upon the child's mouth and nostrils and so interfering with respiration.

The hours of feeding should be properly regulated. Before the secretion of milk is established the infant should not be put to the breast too often or allowed to remain there too long, for the small quantity of colostrum is soon exhausted, and continued sucking will make the nipple sore and tender. Neglect of this simple precaution is the most fertile cause of fissured and abraded nipples.

The following rule should be adopted: On the first day the infant should be put to the breast every eight hours, and allowed to remain there for three minutes; on the second day, every six hours for six minutes. By the third day, as a rule, the secretion of milk is commencing and the child may be put at shorter intervals for a longer time. When the secretion is fully established, the child should be fed every two hours, and should remain at the breast for ten or fifteen minutes. It has already been mentioned that during the night the child should be trained to do without feeds for a period of six hours. It is understood, of course, that the breasts are used alternately. After the child has finished, the nipples should be dried, bathed with boracic lotion and covered

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with a pad of aseptic gauze: this is an important precaution against mastitis. If the nipples are tender, it is better not to bathe them with the lotion, for constant wetting tends to soften the epithelium and increase the tenderness; they should, after the feed, be dried, mopped with glycerinum boracis and covered with gauze as before. The nurse must be instructed to keep a constant look-out for fissures and abrasions and to report their presence immediately.

When the secretion of milk is insufficient for the needs of the child, breast-feeding should not forthwith be stopped and bottle-feeding substituted. Persist as long as possible, alternating, if necessary, breast feeds with bottle feeds, in the hope that a proper secretion may ultimately become established. No amount of extra feeding of the mother will increase the amount of milk in her breasts. Of drugs I have only found two of any use: malt and lactagol. An extract of malt may be given in the usual doses and often has a beneficial effect. Lactagol is a pure extract of cotton-seed in the form of an insoluble white powder: it is claimed that it increases not only the quantity of milk, but also the percentage of protein and fat. A large teaspoonful may be given in milk, three or four times daily; it usually takes three or four days, or even longer, before any effect is apparent. Though lactagol is not uniformly successful, I have found it of great value in some cases.

When the patient first gets up, there is often a temporary diminution in the quantity of milk.

Contra-indications to Breast-feeding.—In certain conditions of the mother or of the infant, breast-feeding is impossible; in other conditions, though possible, it is undesirable.

Conditions in which breast-feeding is impossible.—(1) If the infant has a cleft palate or a hare-lip; (2) if the infant is too premature or weakly to suck; (3) if the nipples are so malformed or retracted that the infant cannot grasp them. Seldom, indeed, is a nipple so retracted that, by proper treatment, it cannot be made serviceable. The most incorrigible form of retraction occurs when the nipple is involved in scar tissue resulting from healing of a former abscess; in such cases, the nipple may be hopelessly fixed below the surface of the breast; (4) if the breasts do not secrete any milk, a very rare condition. Reference has already been made to the plan of giving alternate bottle and breast feeds in cases in which the secretion is inadequate, and to drugs which increase the secretion of milk.

Conditions in which breast-feeding is undesirable.—As a preliminary consideration it must be remembered that breast-feeding

entails a certain amount of extra strain on the "reserve forces" of a woman. During the first month of its existence an infant takes a daily average of about one pint of breast milk. On a healthy woman there is no appreciable effect, though it is a matter of common observation that, if women suckle too long, they become anæmic. But it is quite another matter to a woman who is suffering from disease, and who needs all her available energies to fight some organism that is attacking her: the extra strain on her "reserve forces" may be highly undesirable.

Breast-feeding should be forbidden in—(1) Tuberculosis, especially the pulmonary form. If a woman is suffering from, or has formerly suffered from, pulmonary tuberculosis, she certainly ought not to feed her child. The child is not likely to suffer harm, for tubercle bacilli do not appear in the milk unless there is local disease of the breast; if, however, the disease is in an advanced or acute stage, with swarms of bacilli in the sputum, the child might be infected directly or by inhalation; (2) other wasting diseases, such as carcinoma, chronic sepsis, cardiac disease, renal disease, severe anæmia; (3) acute infectious diseases, especially puerperal infections, (4) syphilis; Colles's law states that a mother may feed her syphilitic infant without danger of being infected. This law has had exceptions, and several cases have been recorded of a primary sore on the nipple when the infant has had sores on the mouth or face. Do not, therefore, let a mother feed her infant if it has manifestation of syphilis, in spite of Colles's law. When the mother acquires infection late in pregnancy, the infant frequently escapes, and the converse of Colles's law (Prophetas's law) states that a syphilitic mother cannot infect her non-syphilitic infant. From an analogy to the exceptions to Colles's law, exceptions to this law also appear possible, so it is wiser not to allow a mother to feed her infant if she have signs of syphilis; (5) after severe hæmorrhage, *e.g.*, ante-partum and post-partum hæmorrhage; (6) puerperal insanity: apart from other considerations, she might injure the infant; (7) local affections of the breasts and nipples. In mastitis the breast must be kept at rest. When fissures and abrasions of the nipple resist all other treatment, breast-feeding must be stopped as a last resource.

When it has been decided not to feed the infant from the breast, measures must be taken to prevent the continued secretion of milk. These are described in the article on Affections of the Breast in Pregnancy and the Puerperium (p. 330).

The Diet.—For the first day or two the patient will not be

troubled with a hearty appetite, but it is by no means necessary to confine her to an entirely liquid diet. A light diet, composed of fish, eggs or milk puddings should be given. After the bowels have acted, she may resume her ordinary full diet. It is quite useless to stuff a patient and to give her extra milk in order to stimulate the breasts to increased secretion; the diet must be adequate, but beyond this it has no influence whatever. There is a popular superstition that certain articles of diet, among which are vegetables, lemons and most forms of fruit, influence in some mysterious way the milk, and give the infant green motions, flatulence and colic. This is quite fallacious, and it is unnecessary to restrict her diet so long as her digestion is not disturbed.

Time of Staying in Bed.—There is no need for the lying-in woman rigidly to adhere to the dorsal position; she may lie in the position she finds the most comfortable. At the end of four days she may be propped up for her meals, and at the end of a week she may sit up for a certain time every day. The time of getting up varies with the practice of the individual physician and, to a less extent, with the inclination of the patient. The most scientific indication is the degree of involution of the uterus and the state of the lochia. The more robust women of the lower classes are accustomed to rise on the eighth or tenth day. It is usual to keep patients of the upper classes in bed for fourteen to twenty-one days. There is a fashion in this as in many other procedures, and there is no doubt we keep patients in bed an unnecessarily long time; but remember that if you urge a patient to rise earlier than she or her friends think fit, and her subsequent return to health is not satisfactory, she will, justly or otherwise, blame you.

Recently some obstetricians have advocated early rising in the puerperium and have allowed their patients to leave their beds on the third or fourth day. They claim that there is less liability to thrombosis and to retroflexion of the uterus. This practice is still in the trial stage, and so far the results have not been uniformly good enough to justify its general adoption.

Getting up should be a gradual process. On the first day the patient should get up for a few hours, and divide the time between lying on a couch and sitting on a chair. On the second day she may walk about her room, and may go downstairs on the third.

Massage during the lying-in time is most beneficial, but should only be employed in those cases which have run a normal course; it improves the general condition and does much to relieve the muscular weakness always felt after a prolonged stay in bed. On

the tenth day gentle massage of the limbs and of the abdominal muscles may be commenced. Always remember that a lying-in woman is easily tired, excited or depressed. Forbid all visitors, therefore, except the husband and near relations, for at least a week. At the end of fourteen days make a bimanual examination of the pelvic organs: retroflexion of the uterus, if noticed, should be treated by a suitable pessary.

The last official visit should be made at the end of a month, when a final examination of the pelvic organs must be made, paying particular attention to the uterus. A displacement, or *subinvolution*, can at this time be more readily cured than if left undisturbed till a later date. If everything is normal, the patient or a responsible relative should be informed of the fact. The physician must take care to guard not only the patient against subsequent ill-health, but himself against a charge of negligence.

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COMPLICATIONS OF THE PUERPERIUM.

CYSTITIS.

A SLIGHT or moderate degree of cystitis may undoubtedly be due to infection per urethram by the bacillus coli. This infection is more likely when there is neglect of ablutions, and the writer has seen it in some cases of complete rupture of the perineum, when contamination of the vulva with fæces readily takes place. It is characteristic of bacillus coli infection that the urine may remain acid, even though containing pus. Prophylaxis of this lesion consists in maintaining a careful toilet of the anus and vulva.

Very severe cystitis in pregnancy may be due to retention of urine and over-distension of the bladder from retroflexion of the gravid uterus. Incarceration, with pressure on the urethra or neck of the bladder sufficient to cause retention, always comes on at about the same date in pregnancy, viz., the fourteenth week, as at that time the uterus is sufficiently large to fill the pelvis; in some cases the retention is preceded by pain and difficulty in, and increased frequency of, micturition; in others it comes on suddenly; and any complaint of trouble with micturition at this stage should demand instant examination; the reason why cases are overlooked, with sometimes a fatal result, is, that after the initial retention there soon supervenes dribbling from an overfull bladder, and when the patient consults a medical man, she may complain "that she cannot hold her urine" and not "that she cannot pass it." The whole prophylactic treatment here consists in early diagnosis and subsequent regular catheterisation until replacement of the uterus has taken place; with this, even if slight cystitis has supervened, it will pass off; if it does not do so, washing out of the bladder may be required.

The writer has seen one case in which distension with overflow had been allowed to go on unrecognised for a fortnight, with the result that the whole of the mucous lining of the bladder sloughed off, with a fatal result.

Cystitis in the puerperium may be due to distension of the bladder being allowed to go on until damage is done to its wall; in septic cases it is considered to be possible for germs to gain direct access by the urethra and so cause cystitis. It has also been

attributed to the inability to completely empty the bladder, which is experienced by some women whilst lying in bed, but in the majority of cases it is undoubtedly due to want of proper care and attention in passing the catheter.

Its prophylaxis consists in the first place in not allowing over distension of the bladder to take place; at the same time the catheter should never be passed unnecessarily; if the patient feels a desire to micturate, if simple means fail, and if the bladder can be felt or seen above the pubes, the catheter must be used. The greatest care should be taken in passing the catheter when it is required; in the first place attempts should never be made to pass the catheter guided by the sense of touch alone, as has sometimes been taught. The urethral orifice should always be clearly seen; it will usually be found that the best position is the dorsal; after careful preparation of the hands and boiling of the catheter the labia should be separated by the thumb and fingers of the left hand, the patient's thighs being far apart; the urethral orifice and its immediate neighbourhood should then be wiped and cleaned of all discharge by means of pledgets of lint or cotton-wool wrung out of some antiseptic solution, preferably mercuric perchloride (1 in 2,000). Especial care must be taken that the catheter does not come in contact with the external parts of the patient or the bed-clothes, and the labia must be held apart until the point of the catheter has entered the bladder.

The greatest care should be taken not to damage the urethra, and its direction in a slight curve upwards and backwards around the pubes should be borne in mind. The catheter should always enter the bladder without using the slightest force, and little pain should be caused; a soft rubber instrument has the advantage that there is less danger of traumatism. The catheter after use should be washed out and boiled, and, if likely to be required repeatedly, should be kept immersed in boric solution in the intervals of use.

As a further preventive of infection some advise irrigating the urethra with boric lotion before passing the catheter, and if any pus is present in the urethra or Skene's tubes this is certainly a wise precaution to take; to do this the glass catheter is passed halfway along the urethra and the latter irrigated with $\frac{1}{2}$ pint of boric or perchloride lotion, care being taken that this does not enter the bladder.

In a patient undergoing repeated catheterisation the administration of urotropine in 10-gr. doses three times daily has been highly praised as a prophylactic treatment of cystitis.

In acute cases it is better to avoid active local treatment

altogether, as this only tends to make matters worse, and many cases recover spontaneously without it; especially should the use of the catheter be dispensed with, unless it is absolutely required. The acute condition is characterised by very frequent and painful micturition with the passage of pus, mucus and blood, and by pyrexia and general malaise.

The patient should be kept at rest in bed on a light, mainly milk, diet, and should be given large quantities of liquid by the mouth, such as plain water, barley water, etc.

If the pain is severe, a suppository of morphia ($\frac{1}{4}$ to $\frac{1}{2}$ gr.) may be given, and relief is often afforded by hot fomentations over the lower abdomen, or by hot vaginal douches, or a hot hip bath. The patient, unless absolutely unable to do otherwise, should sit on the commode rather than use a bedpan. A saline aperient should be administered daily, sulphate of soda in 1 or 2-drachm doses being one of the best.

The following mixture may be given: Sodii Salicylatis, gr. 5; Potassii Citratis, gr. 30; Tinct. Hyoscyami, $\mathfrak{m}20$; Aq. Camph. vel Inf. Buchu, ad \mathfrak{zj} ; quarta quaque hora. [U.S.P. Sodii Salicylatis, gr. 5; Potassii Citratis, gr. 30; Tinct. Hyoscyami, $\mathfrak{m}20$; Aq. Camph., \mathfrak{zj} ; Aquam, ad \mathfrak{zj} , vel Inf. Buchu, ad \mathfrak{zj} .]

When the symptoms have somewhat subsided, urotropin in 10-gr. doses three times daily may be given, or Salol, 10 gr., Mucilaginis Tragacanthæ, q.s., Aquam, \mathfrak{zj} , three or four times daily; or boric acid (5 to 10 gr.) in \mathfrak{zj} of water, every four hours. Urotropin is considered to be especially efficacious in colon bacillus infection.

If the symptoms do not abate but remain severe, and especially if there are indications of septic poisoning from the bladder, the latter may have to be drained. This can be done either by fixing in a self-retaining catheter, or more efficaciously by making a temporary vesico-vaginal fistula; to do this, the patient should be placed in the lithotomy position; a bladder sound is passed and is pressed against the vesico-vaginal septum about halfway between the internal orifice and the cervix in the middle line; its point is then cut down upon from the vaginal side, and the fistula thus formed. The opening usually closes spontaneously in from two to three weeks, but if not, it can be repaired by a plastic operation when the cystitis has subsided; this proceeding is seldom required, but the writer believes that in one case he saved life by it in a woman who was becoming profoundly septic from a severe cystitis.

In the subacute and chronic cases the following line of treatment may be adopted: The patient should be kept largely at rest obtaining, however, as much fresh air as possible; the bowel

should be carefully regulated ; the diet should be bland and unirritating, meat, pickles, spices, vinegar, alcohol, etc., being avoided ; an abundance of water should be taken.

In these cases the balsams, such as copaiba and sandalwood, have their most useful application.

Sandalwood is the one most preferred, and may be given as follows : *Ol. Santal. Flav.*, $\text{m}20$; *Pulv. Tragacanth.*, gr. 10 ; *Aq. Cinnamomi*, 3j ; *quarta quaque hora*. Or the same dose of oil may be given in gelatine capsules, 10 min. in each : salol in 10-gr. doses, as described above, may also be given.

In *Bacillus coli* infection with acid urine, the following prescription will be found useful : *Urotropin*, gr. 10 ; *Potassii Citratis*, gr. 20 ; *Aq.*, ad 3j ; *quarta quaque hora*.

With an alkaline urine one may give : *Sodii Benzoatis*, gr. 10 ; *Aq.*, ad 3j ; *quarta quaque hora*.

If under this treatment there is no improvement in a reasonable time, say ten to fourteen days, it will be wise to commence washing out the bladder. This may be done once or twice a day, and the following is the method of procedure : A soft rubber catheter may be used, in the end of which a piece of glass tubing, 2 to 3 inches long, is inserted. The catheter is passed and the bladder emptied ; then a piece of rubber tubing some 2 feet long is taken, of a size to fit readily on the glass tube. One end of this is connected with the glass tube, and the other fixed on a small glass funnel, the solution to be used is placed in a jug, the funnel is then raised to the height of about 2 feet above the patient, and the fluid gently poured in ; the amount to be used is regulated largely by the sensations of the patient ; as soon as pain is caused and a strong desire to urinate, no more should be poured in, but the funnel should be lowered below the level of the patient's body, and the fluid allowed to escape. This manœuvre may be repeated several times at each sitting. It will usually be found that from 2 to 4 oz. is the amount which can be tolerated at once with comfort. If the bladder is very sensitive a solution of cocaine (2 per cent.), may be used first, to be followed by the antiseptic.

The solutions in general use are the following : Boracic Acid, half-saturated solution ; Perchloride of Mercury, 1 in 10,000 ; Nitrate of Silver, 1 in 1,000 ; Zinc Sulpho-carbolate in 2 per cent. solution ; Formalin, 1 in 5,000 ; Protargol, 1 in 1,000. The nitrate of silver solution is the one which is generally found to be most efficacious. When boracic lotion is used, 1 drachm of iodoform emulsion may be introduced with the last instalment of lotion and left in the bladder.

If the cystitis still persists, the bladder should be examined with a Kelly's cystoscopic speculum with the patient in the genupectoral position ; in many cases it will be found that there are patches of ulceration in the bladder wall. Nitrate of silver in 2 per cent. solution may be applied to these ulcerated patches by means of small pledgets of cotton-wool held in long, thin, catch forceps. Vaccine treatment has been tried with good effect, especially in *Bacillus coli* cystitis.

C. E. PURSLOW.

INSANITY OF THE PUERPERIUM.

INSANITY of the puerperium in most cases begins within a short time of labour, half the cases commencing within the first week of the puerperium. It is most common in primiparæ. It takes a maniacal form in the majority of cases, and is sometimes very severe. Insanity commencing after the first fortnight may take a melancholic form.

Heredity is a strong factor in its production ; it may be brought on by a sudden shock, and is particularly common in the unmarried. In a large proportion of cases it is associated with sepsis, and it may sometimes be a difficult matter to say whether a given case is one of puerperal insanity associated with septicæmia or of puerperal sepsis with maniacal delirium.

Prophylactic Treatment.—In addition to the precautions against sepsis which should be taken in every labour, in any case in which there is reason to fear the occurrence of insanity, every effort should be made to shorten the pain and the nervous strain of a prolonged labour. Forceps should be used under anæsthesia, if at all indicated, or such other measures taken as seem advisable to attain this end.

One of the earliest prodromal symptoms is sleeplessness, and the occurrence of this shortly after a parturition should be looked on with great suspicion. Another early symptom is headache. After a sleepless night the patient appears apathetic, takes no interest in the baby, and frequently shows violent dislike to the doctor, nurse and relatives. Complete distaste for food rapidly follows, and then the patient begins to talk incoherently. Homicidal and suicidal tendencies may be present.

The prognosis is good, recovery taking place in something like 70 per cent. of the cases, and the recovery is usually complete, no dementia remaining. But it is important to remember that a subsequent pregnancy may precipitate another attack.

Curative Treatment.—The patient needs early and active treatment. The question as to removal to an asylum is largely one of means ; if the house is sufficiently roomy that the patient can be isolated, and if there is the possibility of her getting fresh air, then she may be kept at home. At least two trained mental nurses will

be required. If these conditions cannot be complied with, she must be removed to an asylum without delay. She should never be left alone, and the child should in all cases be taken away from her.

The most important point in treatment is to procure sleep and to administer food. The latter should be nourishing and easily digestible, eggs and milk in the form of custard being most suitable. If the patient will not swallow, this must be administered by a nasal tube.

Dr. Clouston believes that a good meal with a fair amount of alcohol introduced into the stomach acts as a better and safer hypnotic than any drug; he advises a custard made of three eggs, 1 pint of milk with cream, 4 oz. of port wine and some strong beef-tea, and when food cannot be swallowed he introduces this amount twice daily by nasal tube.

As regards sedatives it is much better if possible to avoid them, and to trust to the soporific effect of food and alcohol, but if a hypnotic has to be given, probably bromide in a dose of 40 to 60 gr. is least harmful; some prefer paraldehyde in 1 or 2 drachm doses. If there is no sign of heart failure, chloral in doses of 20 to 40 gr. may be given.

Morphia is generally discountenanced, mainly owing to its effect in increasing the distaste for food.

Hot baths may be tried as a soporific.

If the insanity is associated with septicæmia, quinine, in 3 to 5-gr. doses, should be given every four hours, and the uterus should be explored, under an anæsthetic, if possible; any decidua remains or clot should be removed from the uterus, and its interior well washed out with an antiseptic solution; one of the best for this purpose is tinct. iodi., 2 drachms [U.S.P. 40 min.] to 1 pint of water, using several quarts of the solution. This should be done with a double current intra-uterine tube or a blunt flushing curette. Subsequently vaginal douches should be given. Anti-streptococcus serum in doses of 10 to 20 cubic centimètres may be injected subcutaneously once in twelve hours.

The prognosis in puerperal insanity is decidedly good, and one-half of the recoveries take place within three months of the commencement of the attack.

The recovery is in many cases marked by the recurrence of menstruation, which is usually in abeyance during the attack. Improvement in physical health and increase in weight also usually attend recovery. Savage states that, if the physical health is re-established without improvement in the mental condition, the prognosis is bad.

INSANITY OF LACTATION.

This occurs almost entirely among the poor, and is a result of the weakness induced by long-continued lactation, the object of the latter usually being to avoid the rapid recurrence of another pregnancy. Insanity is more apt to follow one of the later of a series of rapidly repeated pregnancies.

The patient is generally thin, weak and anæmic, and the brain disorder takes the form of depression, passing on to melancholia with delusions, and not infrequently suicidal impulses.

If the preliminary symptoms of depression and insomnia are treated actively, insanity may sometimes be warded off. The treatment in such a case is that suckling should at once be stopped, and the strength supported by good food, cod-liver oil and fresh air.

The treatment of a case in which insanity has supervened should be carried out on similar lines. Suckling should be stopped, plenty of readily digestible nourishment given, the patient freed from the cares and worries of the family and home, and if suicidal tendencies are present she should be carefully watched. All this, unless the patient has means, will involve removal to an asylum.

As regards drugs, cod-liver oil, quinine and iron are necessary, and a hypnotic may be required; for this purpose potassium bromide (1 drachm) or paraldehyde (1 drachm) appears to be the best. Sulphonal is dangerous and morphia is inadvisable. One advantage of paraldehyde is that its disagreeable taste tends to prevent a habit being formed.

C. E. PURSLOW.

PARALYSES ASSOCIATED WITH LABOUR AND THE PUERPERIUM.

CEREBRAL HÆMORRHAGE may be caused by the strain thrown on the arterial walls by the exertion incident to labour and in any patient in whom there is reason to suspect a tendency to arterial degeneration, steps should be taken to reduce the strain as much as possible, as by terminating labour by forceps in suitable cases.

It may be noted here that labour can be quite satisfactorily completed spontaneously, even when there is complete paraplegia from a transverse lesion of the cord or paralysis from a cerebral lesion.

Paralysis caused by parturition may be due to pressure on the lumbo-sacral cord at the brim of the pelvis; this is apt to arise in cases of generally contracted pelvis, or, when the pelvis is normal, in unfavourable positions of the head, such as face or brow presentations. The resulting paralysis is almost always unilateral and is attended by much pain; the parts most severely affected are those supplied by the peroneal nerve; sometimes the superior gluteal nerve which takes its origin from the lumbo-sacral cord is affected.

In some cases this injury is due to forceps and it is said to be more likely to occur if "pendulum" movements are used; when the injury is due to the forceps, cords of the sacral plexus lower than the lumbo-sacral may be involved and the resulting paralysis may affect the internal popliteal nerve rather than the peroneal.

The treatment does not differ from that of similar paralyses occurring in non-puerperal cases, and consists in measures for relieving the pain in the early stages, including morphia, if necessary, and later, massage and electricity.

Myasthenia gravis has been met with as a complication in the parturient woman, and, in some cases, Cæsarean section has been performed to save the patient the muscular effort of labour, as there was reason to believe that the resultant exhaustion would prove fatal.

Cerebral thrombosis may follow severe hæmorrhage in connection with labour. The prophylaxis will consist in taking all means possible to maintain the cerebral circulation, such as lowering the head, bandaging the abdomen and limbs.

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Paraplegia of spinal origin has been known to follow severe post-partum hæmorrhage.

Paralyses Associated with the Puerperium. — The most common form of paralysis is that due to peripheral neuritis, the latter arising from the toxic action on the nerves of septic poisons in the blood. This neuritis may affect any of the nerves. The paralysis in these cases does not usually show itself until after the first week of the puerperium, thus differing from that due to injury of the sacral plexus, which begins at once; it does not differ in its symptoms from neuritis due to alcohol or other toxic agents; it has on many occasions been found in association with phlegmasia alba dolens.

Another form of neuritis following labour at an even later stage is that due to involvement of nerves by inflammatory exudation. This may be due either to pressure or to extension of the inflammatory process to the sheath of the nerve. Paraplegia due to myelitis of septic origin has also been described.

Rest in bed is the first essential. The pain may be relieved by hot fomentations, salicylate of soda, coal-tar preparations, or, if other means fail to relieve, by hypodermic injections of morphia or cocaine ($\frac{1}{8}$ to $\frac{1}{4}$ gr.).

Later iodine should be given internally, also quinine and strychnine, and, when the pain has disappeared, massage with passive movements and electricity will be advisable, the latter in the form of the galvanic current, slowly interrupted.

Care should be taken to prevent contractures or deformities. These are generally due to the tendency of the calf muscles and the hamstrings to contract and overpower their opponents; the feet should consequently be kept from dropping and the knees from flexing by suitable appliances.

Cerebral embolism may occur in the puerperium as a result of septic endocarditis.

C. E. PURSLOW.

PUERPERAL INFECTION.

THE treatment of puerperal infection is divisible into two parts :
(1) Its prevention and (2) its cure.

Neither of these can be adequately dealt with without first discussing the processes concerned in the production of the condition.

The Nature of the Lesion.—In all puerperal infection a primary lesion exists, *i.e.*, an area through which the infecting organism first obtains access to the tissues of the patient. This primary lesion may be situated either in the vulva, the vagina (including the perineum), the cervix, or the body of the uterus.

From this primary lesion the infection may spread by continuity of tissue to surrounding parts, producing a consecutive lesion, or may be transported by the blood-stream to situations remote from the genital tract and establish a metastatic lesion.

The lesions of puerperal infection are therefore of three kinds, primary, consecutive and metastatic, each of which requires separate consideration.

The Primary Lesion.—The commonest position for the primary lesion is the placental site. Here exists a natural wound fronting into a cavity which, if the cervix is closed, is but poorly drained, and which always contains in the earlier days of the puerperium a certain amount of blood clot and *débris*. This wound is in direct relation with the large venous sinuses in the wall of the uterus, and thus both by reason of its position and its structure presents an area peculiarly favourable to the growth and subsequent spread of organisms implanted there. Post-mortem examination of patients dying of puerperal sepsis reveals the placental site in varying degrees of acute inflammatory necrosis or suppuration.

The cervix is less commonly the situation of the primary lesion. In these cases laceration during labour has occurred, and the wound is either sloughing or suppurating.

The vagina, by reason of its tough resisting structure, is rarely primarily implicated, but perineal and vulval wounds, by reason of their superficial position, very commonly or always become infected within a short time after their production. Fortunately their very superficiality, the ease with which they drain, and their position, remote from any large tract of important lymph channels or large blood vessels, allow of inflammation to take place with a minimum

risk of grave toxic or septic absorption. They form, however, a breeding-ground from which organisms may ascend to the upper part of the genital canal.

Consecutive Lesions.—Starting from the primary lesion, the infection may extend by continuity of tissue in various directions.

This consecutive extension may take place in three ways: (1) By surface extension along the mucous membrane of the canal; (2) by lymphatic conduction, either capillary or trunk, producing cellulitis and lymphangitis; and (3) by phlebitis, resulting in thrombosis of the affected veins.

The character and situation of the consecutive lesions vary, therefore, according to the situation of the primary lesion and the method of extension from it.

In primary placental site infection it may take the form of salpingitis and peritonitis (surface extension), of broad ligament cellulitis (lymphatic extension), or of a thrombo-phlebitis of the ovarian or uterine veins (venous extension). All these consecutive lesions are common in the severer forms of puerperal sepsis, either singly or in association.

When the primary lesion occurs in a cervical laceration the placental site may be consecutively infected, or extension may take place along the lymphatics in the lower part of the broad ligament, producing cellulitis there.

Infected perineal lacerations may be the starting-point of a thrombo-phlebitis of the recto-vaginal septum, while the liability for the organisms to infect the upper part of the genital canal by consecutive spread has already been referred to.

Metastatic Lesions.—Metastatic lesions by vascular conveyance may originate either from the primary or the consecutive lesions. They are of two kinds, toxæmic and septicæmic.

In the first case the toxins of the bacteria in the infected area alone are absorbed into the blood-stream; in the second the bacteria themselves find entrance there. In both cases the process originates in the vessels, particularly the veins of the inflamed area.

Toxic absorption occurs in every case of puerperal sepsis more or less, and the presence of soluble organic poisons dissolved in the blood plasma produces degenerative changes in the tissues of the whole body, and most markedly in those highly specialised.

Thus acute cloudy swelling of the hepatic and renal cells occurs early, and similar degenerative changes are found in the heart muscle and elsewhere. When the patient lives long enough, definite fatty or fatty hyaline degeneration follows, and the kidneys and liver are found pale and swollen post-mortem.

Septic absorption is probably always due to the breaking down of infected thrombi in the veins of the area of primary or consecutive infection, whereby bacteria are launched into the blood-stream. There are two degrees of this disaster. In the first and least, sporadic transmission occurs and produces a solitary metastatic lesion, such as a localised pleurisy, in spite of which the patient may recover. No organism can be isolated from the blood in these cases.

In the second and graver degree, the entrance of bacteria into the blood-stream is overwhelming, and the organisms probably multiply therein, so that cultures or even smear preparations at once reveal their presence there. The circulating organisms set up multiple metastatic lesions all over the body, of which septic pneumonia, bilateral pleurisy and infective endocarditis are common types.

The Bacteriology of Puerperal Infection.—The common causal organism in the graver forms of puerperal infection is the *Streptococcus pyogenes*.

In an investigation into the causation of puerperal infection by A. G. R. Foulerton and the writer,¹ this organism was present in over 60 per cent. of the cases in which the uterine cavity was found to be infected.

It was associated in almost all the graver cases with the *B. coli communis*, the latter organism probably representing a secondary infection, for it was shown that pure *B. coli* infection is uncommon.

Most of these cases of mixed streptococcus and *B. coli* infection died. In a small proportion of cases the pneumococcus took the place of the streptococcus as the primary infection.

In the slighter forms of puerperal fevers, staphylococci, either pure or in association with the colon bacillus, were isolated. In many of these cases the uterine cavity itself was found to be sterile, the vagina and cervix alone showing bacterial growth associated with lacerations of those parts. Exceptionally other causative organisms were found, such as the gonococcus, the *B. pyocyaneus*, bacilli of the diphtheroid group and others.

The results of the investigation referred to above are in accordance with those of other workers, and with them establish the fact that puerperal sepsis is in most cases due to the ordinary organisms of sepsis as it occurs in other parts of the body.

The classification of puerperal fevers into two groups, the septicæmic and sapræmic, is not supported by evidence. The term "sapræmia" was applied on the assumption that the decomposition of material retained in the uterus by putrefactive but not parasitic

organisms gave rise to toxic products, which were absorbed by the tissues without they themselves being infected. This is now shown not to be the case.

Metastatic lesions are the gravest, because they imply a generalised blood infection and an enormous area over which toxic absorption is going on. Consecutive lesions are less fatal, whilst a case which presents symptoms apparently solely due to the primary lesion is the most hopeful of all.

Method of Infection.—Puerperal infection may be autogenetic or heterogenetic *i.e.*, the organism may have been resident in the patient before the confinement, or may have been introduced from without during its course or afterwards.

In regard to autogenetic infection, the bacteriology of the genital tract in the normal puerperium has been investigated by many workers with results of a very conflicting kind as regards the germ content of the uterine cavity. Thus some investigators have found organisms in the uterus in a large proportion of normal puerperal women, whilst others have found it almost always sterile under these circumstances.

It is noteworthy that the greater the precautions taken to ensure a sample of the uterine contents uncontaminated by cervical or vaginal secretion, the less frequently have organisms been isolated from the uterus. The investigations of Foulerton and myself, which were carried out with special precautions of this kind, showed that the interior of the normal puerperal uterus was sterile in all cases.

Researches upon the bacterial contents of the normal puerperal vagina also show divergent results, some observers having found streptococci there in as many as 15 per cent. of the cases examined. Foulerton and I found that the colon bacillus and staphylococcus albus are frequently present therein, but we failed to isolate any organism of greater virulence in the normal cases we examined.

These findings have been confirmed by other investigators, and Whitridge Williams has specially pointed out that the presence of streptococci in the culture tubes taken from such cases is due to insufficient care having been taken to exclude vulval contamination. Under abnormal circumstances other organisms may, of course, exist there, notably the gonococcus.

As regards the bacteriology of the vulva, all observers agree that streptococci are not infrequently found there under apparently normal circumstances, while *B. coli* and staphylococcus albus can constantly be isolated therefrom.

Foulerton and I made some observations on the cervix in cases

of chronic cervicitis. In many of these staphylococci were isolated, either of the yellow or white variety. The gonococcus was also found, as was on one occasion the pneumococcus, but streptococci were absent in all the cases.

The position may thus be summed up : The normal puerperal uterus is sterile. The normal puerperal vagina (and probably the cervical canal as well) contains staphylococcus albus and *B. coli communis*, but no other organisms of greater virulence.

In about 10 per cent. of normal puerperal women the vulva contains streptococci. Under abnormal conditions the vaginal cervix and vagina may contain organisms of potential virulence, namely, streptococcus, pneumococcus, staphylococcus aureus or the gonococcus.

Bacteria, therefore, capable of giving rise to symptoms of more or less severity exist in the general tract of all puerperal women, and it follows that the greatest care on the part of the attendant will not always suffice to prevent infection of wounds of the cervix, vagina and vulva. The uterine cavity, however, the most serious site of infection, is normally sterile, and organisms present there must either have been carried by hands or instruments passed up the vagina, or must have made their way by ascending growth. It is only in the second of these two happenings that infection of the uterine cavity can be strictly styled autogenetic.

There is, however, a further method of bacterial infection of the puerperal genital tract which must be taken into account, namely, the migration of organisms to it from the adjacent large intestine. The liability of the intestinal organisms to pass from the bowel to damaged tissue in its neighbourhood is well known.

For this reason prolonged labour, associated with bruising and partial devitalisation of the soft parts, is liable to be followed by puerperal sepsis, even when the labour has been conducted with great antiseptic precautions.

The more severe forms of puerperal fever are, however, nearly always heterogenetic in origin, for though, as has just been shown, bacteria of potential pathogenicity are present in the genital tract to a greater or lesser extent in all women, yet their virulence is low, and a degree of immunity doubtless exists in all individuals to the organisms habitually parasitic upon them.

The virulence of pathogenic bacteria is rapidly lost unless they are frequently re-cultured upon a suitable medium; while, on the other hand, it is exalted by successive transference from individual to individual. The worst examples of puerperal sepsis, therefore, are those seen in the progress of an epidemic of these cases, such as,

unfortunately, still sometimes occurs in the practice of medical men and especially midwives.

Whether carried there by manipulation or migration, the growth of organisms in the cavity of the uterus is greatly facilitated if it contains unexpelled portions of secundines or blood-clot, for these furnish a nidus wherein the bacteria may multiply undeterred by the cells and fluids of the living tissues. Moreover, the relaxed state of the uterus leaves pervious many venous and lymphatic channels which would otherwise be closed, so that, infection occurring, the process more easily spreads to the deeper planes of the uterine wall and from thence to the tissues outside it.

THE PREVENTION OF PUERPERAL SEPSIS.

Although death or severe illness from puerperal sepsis is almost unknown in well-organised lying-in hospitals, yet these disasters are still not infrequently met with after home-conducted labour.

The reproach of the continued existence of a preventible disease lies, however, not only on the medical and nursing professions, but on the public at large.

The horribly insanitary houses, and the utter want of ordinary cleanliness in the midst of which labours are every day taking place, is a scandal to the community. Education in the general advantages of cleanliness is urgently required, and some means should be sought to teach young women its special importance in child birth.

It is, however, no use teaching the cult of cleanliness to persons whose environment and means render its practice impossible. Stricter supervision of lodging-houses and tenements is required. There still exist in all great cities thousands of houses which are unfit for the habitation of human beings. The means of cleanliness should be at the service of the poorest, and a hot-water service supplied by generators under the care and charge of the municipality should be in every dwelling.

Finally, payment of the accoucheur on a scale commensurate with the importance of the event and the knowledge, time and appliances required of him for its proper conduct may be justly urged.

There is no branch of medicine so poorly paid as obstetrics, there is none of greater importance; in no other capacity does the doctor's success bring so little praise, or failure so much obloquy. The precautions necessary for the modern ideal conduct of labour are those of a surgical operation. The skill required when difficulty arises is quite as great, the time demanded much greater.

The obligation of the public to pay a fair price for these necessities

of safe labour is not less than that of the medical man to give them.

The duty of the doctor in regard to the prevention of puerperal sepsis is clearly indicated from a consideration of the established facts concerning its causation epitomised above.

It may be thus set forth: (1) To ensure sterility of his hands and appliances; (2) to sterilise, as far as may be possible, the lower part of the genital tract; (3) to avoid, as far as may be possible, the transference of organisms from the lower to the upper part of the genital tract; (4) to re-sterilise the genital tract, as far as may be possible, whenever such transference may reasonably be supposed to have occurred; (5) to leave the uterus empty and well retracted, and to promote free drainage from the vagina afterwards; (6) to prevent the bruising and devitalisation of the soft parts due to prolonged pressure during labour.

Sterilisation of the Hands and Instruments.— Perfect sterilisation of the hands is not only an impossibility, but the attempt to carry it out by prolonged soaking in strong chemical solutions defeats its own end by making the skin rough.

Rough scaly skin is particularly to be avoided, for dirt very readily adheres to it, whilst the loosened epidermal scales readily become detached and form potential carriers of infection.

For this reason alone *the use of sterilised rubber gloves* in the conduct of labour is strongly to be insisted on. Their employment, of course, does not absolve the attendant from the duty of rendering his hands as aseptic as may be possible in consonance with the integrity of the skin, but it obviates the necessity of employing antiseptic solutions of such strength that their continued use makes the hands rough.

But there are other advantages, no less important, to be gained from the wearing of gloves. They protect the hands from contamination by pathogenic organisms. Although the skin of the hands is never sterile, yet the organisms found there are normally of low virulence. The careless touching of a surface known to contain virulent bacteria infects the hand with these organisms, which may continue to reside in the skin for a long time. The practitioner who habitually uses gloves in all the manipulations of his daily practice likely to be associated with risk of septic contamination, such as the dressing of wounds, making vaginal and rectal examinations, etc., may reasonably be supposed to have comparatively aseptic, though not sterile, hands.

The use of gloves protects the reputation of the doctor and gives confidence to the patient. In these days the public has a general

knowledge of the infective nature of inflammation, and is quick to appreciate attempts to prevent it. Should sepsis unfortunately follow a labour, the practitioner who has worn gloves is much less likely to incur odium than he who has not, whilst, be this as it may, his own conscience will at least be satisfied that he had taken the utmost precautions known to science to prevent it. It has been objected that gloves spoil the sense of touch, but this is a drawback which practice will quickly overcome.

Instruments and all appliances made of glass or rubber are readily sterilised by boiling, and a steriliser should form part of the equipment of every midwifery bag. The lining of the bag should be removable and capable of being boiled, whilst all other articles, such as waterproof aprons, etc., which it is not desirable to treat so, may be washed with carbolic or formalin solution.

As regards antiseptic solutions, the biniodide of mercury is the best for general purposes. To a bowl of it (1 in 1,000) the rubber gloves should be transferred after they have been boiled, and they should be put on filled with the solution.

During the progress of the case the gloved hands should be frequently washed in the solution to maintain their sterility, whilst the external genitals and anal region of the patient should be carefully swabbed with it prior to every introduction of the finger or hand into the vagina.

Sterilisation of the Lower Genital Tract.—Patients should be strongly impressed with the necessity of keeping the external genitals well washed with soap and water at least twice a day for some weeks before delivery is expected. As regards the preparation at the actual time of labour, there can be no doubt that a thorough surgical procedure, including shaving of the pubic hair, would be the ideal. This, however, is a counsel of perfection, and in most cases something less will be attainable. The nurse must be instructed to wash well the parts with soap and water and then to swab them thoroughly with whatever antiseptic solution has been chosen for use during the labour. Special attention should be paid to the anal region and the pubic hair, which may be cut short where it approaches the vaginal outlet.

The use of a vaginal douche at the outset of labour is not to be recommended as a routine, since it has been shown that the germ content of the normal vagina is not markedly septic. After every examination or the introduction of the hand or instruments the canal should be swabbed out with pieces of wool mounted on a forceps soaked in the antiseptic solution, whilst every labour should be terminated by a thorough irrigation of the vagina.

Avoidance of Transferring Organisms from the Lower Genital Tract.—The transference of organisms from the vulva to the upper part of the vagina is to be avoided (1) By sterilising the vulva as thoroughly as possible before introducing anything into the vagina; and (2) by limiting such introduction to that which is absolutely necessary.

In regard to the first of these enough has already been said (*see* above). As concerns the second, no unnecessary vaginal examination should be made. When all is going well, a single investigation immediately after the rupture of the membranes will suffice, remembering that every introduction into the vagina is accompanied by a definite risk of infecting that canal.

Conveyance of organisms into the previously sterile uterine cavity is still more to be avoided. If it is borne in mind that the vagina always contains bacteria, and that it is impossible to pass anything into the uterus *via* the vagina without infecting the cavity of the former, it will be seen that the only way of preventing this would be to never pass anything into the uterus. In many cases of difficult labour this is impossible, and then the obstetrician has no alternative but to carry out manipulations which he knows must implant organisms (not necessarily septic, of course) in the previously sterile uterine cavity. The solution of this difficulty is discussed under the next heading.

Re-sterilisation of the Genital Tract after Probable Infection.—The propriety of swabbing out the vagina after the passage into it of hands or instruments possibly contaminated with vulval organisms has already been insisted on, as has the routine use of a vaginal douche at the conclusion of the labour.

It is most important to realise that the passage of a single finger or the blade of a forceps into the uterine cavity surely destroys its sterility.

It is true that the chance of virulent organisms being thus conveyed is not great, whilst even in that event the natural resisting powers of the tissues may render the occurrence harmless, but nevertheless a certain risk is always run. This risk, as has been pointed out, cannot be avoided in some abnormal labours, and it is therefore obvious that when it has been necessary to introduce the hand or instruments into the uterus, the cavity should be thoroughly washed out with an antiseptic solution immediately after the close of the third stage. This is the more easily done because the modern conduct of difficult labour requires a general anæsthetic, which should be prolonged for the purpose.

An Empty Uterus and Free Vaginal Drainage.—The

increased facilities for the growth of organisms offered by retained blood-clot, or portions of the placenta or membranes, have been referred to.

In addition, the deficient retraction of the uterine wall, which such retention gives rise to, leaves the uterine sinuses open or merely plugged with soft clot, instead of their channels being obliterated by the retracting muscle fibres.

The importance of obtaining complete evacuation of the cavity and firm retraction of the wall of the uterus is therefore obvious. The natural process of the birth of the placenta should not be interfered with without cause. It is certain that the practice of expressing the placenta from the uterine cavity before the normal mechanism of separation has had time to operate is likely to lead to retention of fragments of that structure or of the chorion. When the placenta is still in the uterus, at least half-an-hour should be allowed to elapse before attempting to express it.

After the birth of the placenta it is important to maintain hold of the fundus until firm retraction seems assured. The use of ergot to promote retraction, when the obstetrician is satisfied that the placenta and membranes have been delivered entire, has much to recommend it. Its administration when clot or portions of secundines are retained in the uterus is, however, apt to obscure the fact that the uterus is not empty by the temporary cessation of the bleeding which it may effect.

In all cases of abnormal bleeding after the delivery of the placenta the uterine cavity should be at once explored with the gloved hand, when a mass of clot will invariably be found there.

A study of a number of cases of puerperal fever shows that in a large proportion of them post-partum hæmorrhage of varying degree has occurred.

The practice of treating post-partum hæmorrhage from the uterus by hot douching, ergot and compression, but without exploring the uterus, is a very bad one, because, although it may succeed in stopping the bleeding more or less, clot is left retained in the uterine cavity.

The uterus having been explored and emptied, a hot intra-uterine douche should be immediately given, after which the uterus is grasped from the abdomen till such time as the muscle has permanently retracted. This is properly accelerated by the hypodermic administration of ergotin or pituitary extract. If this practice is followed, bi-manual compression or plugging the cavity with gauze will rarely be required.

Free drainage from the vagina is also an important factor

operating against puerperal sepsis, and in this connection it may be remarked that the prolonged maintenance of dorsal decubitus favours the accumulation of a puddle of lochia in the upper part of the vagina which forms an admirable culture medium for organisms.

Amongst primitive races the puerperal woman resumes her usual avocations within a day or two of labour, and the standing and sitting posture involved promotes the free escape of the lochia from the vagina.

Amongst civilised women this practice is for many reasons not expedient, but I am of opinion that after all ordinary labours the patient should be allowed to sit up in bed next day and get up as soon as she wishes, provided that the temperature is normal. This shortening of the puerperium has been lately strongly recommended by Haultain.

The removal of lochial discharge from the vagina is hastened by the practice of *vaginal douching*, a practice which I strongly advocate, whenever a trained nurse is available to carry it out.

The rapidity with which any hæmorrhagic discharge becomes offensive is well known. Thus the menstrual loss is often more or less foul-smelling, especially when excessive, as is hæmorrhage from the mouth or nose when long continued. In these instances antiseptic irrigation is practised as a matter of course.

The frequency with which the lochia become offensive without any febrile symptoms is a matter of common experience. The practice of vaginal douching after labour is not only to be recommended on the score of ordinary cleanliness, by which it appeals to all nice-minded women, but it is peculiarly reasonable in view of the length of time that the civilised puerperal woman remains recumbent, a position in which the free drainage from the vagina is interfered with.

The objection has been urged against douching that organisms may be carried up into the vagina from the vulva, and from thence may make their way to the uterus. That organisms might be so transported to the upper part of the vagina, and even maintain themselves there in spite of the douche solution, is indeed possible, but the risks are as nothing to those associated with a culture medium carefully prepared by lochial retention at the top of a cavity (the vagina) normally containing organisms, and in juxtaposition to one (the rectum) swarming with them.

The Prevention of Injury to the Soft Parts.—Finally we come to the part played by injury to the soft parts in the production of puerperal sepsis.

Such injuries are the result either of tearing or bruising or of

both combined. Lacerations acutely produced, and not associated with bruising, and devitalisation of the tissues in their neighbourhood, are the least serious from the point of view of future sepsis. They constitute a wound capable of being infected, and open up lymph and blood channels, along which that infection may extend, but as the tissues bounding them are healthy, organisms implanted in them may fail to produce more than a local reaction. Wounds like this, if properly sutured with antiseptic precautions, usually unite at once. It is on this knowledge that the practice of deliberate incision of the perineum in front of the head is founded, and such other operative procedures as multiple incision of the cervix or vaginal hysterotomy (vaginal Cæsarean section).

Bruising by prolonged pressure is a much greater incentive to infection, because the vigour of the tissues is much lessened and organisms, finding entrance there, readily overpower them. Moreover, as has been pointed out, tissues partly devitalised and the seat of blood extravasation from continued trauma appear to exercise a chemiotactic influence to bacteria, so that though originally sterile, there is a strong tendency for migratory infection to occur.

The worst type of injuries are those combining a breach of surface with tissue bruising, for then not only is the local resistance much lowered, but a direct route for organisms to the damaged area is present.

Some laceration of the soft parts, particularly of the perineum, is necessitous in first labours. Such wounds should, of course, be immediately sewn up whenever possible. Many, however, are of the nature of superficial abrasions about the vaginal outlet and suture is impossible. The surfaces of such abrasions probably always become infected more or less, and it is in these cases that routine vaginal and vulval irrigation is particularly desirable.

In difficult delivery, again, some tearing of the soft parts is frequently unavoidable, but it should be minimised as much as possible. Thus the risk of dragging the head through a partially dilated cervix is obviated by the previous use of Champetier's bag, whilst timely craniotomy is to be chosen in preference to a forceps delivery requiring prolonged effort and much force.

Prolonged pressure on the soft parts is most of all to be avoided, and there is less risk of subsequent sepsis from rapid instrumental extraction even with laceration than from the tissue bruising which protracted natural delivery causes.

In conclusion of the subject of the prevention of puerperal sepsis, I would emphasise the importance of treating a case of difficult labour like a surgical operation. It is not the normal case left

entirely to nature that commonly "goes septic," neither is it that in which artificial delivery has been effected with the full precautions of modern surgery, but it is that in which a certain amount of interference has been carelessly and unsurgically practised.

THE CURATIVE TREATMENT OF PUERPERAL SEPSIS.

In the curative treatment of puerperal sepsis early recognition of the disaster is extremely important.

The symptoms may supervene at any time during the first fortnight, and occasionally after an even longer period.

The most severe cases declare themselves a few hours after labour, but the larger proportion begin to show definite symptoms from the third to the fifth day. Even in these, however, or in those which do not start till the second week, an inspection of the temperature chart will show as a rule that slight fever has been irregularly present since the confinement.

Though it is possible that emotional disturbance, constipation or painful swelling of the breasts *may* produce a rise of temperature yet by far the commonest cause of fever in the puerperium is toxic absorption from the genital tract. In view of the importance of the early treatment of puerperal sepsis all rises of temperature in the puerperium should be accounted as due to this cause, unless good proof to the contrary is forthcoming. *A temperature of 100°F., if it has existed for twenty-four hours, should be considered as an indication to act. A temperature of 101°F. or over should be regarded as an immediate indication.* The prognosis of puerperal fever bears a definite relation to the period at which active treatment is first begun; cases vigorously dealt with at the very outset of the symptoms usually recover, but when valuable time has been lost before the true nature of the trouble was borne into the mind of the obstetrician, the mortality is considerable.

There is a natural tendency on the part of the attendant to hope that the symptoms are due to a lesser cause, and to find some other explanation for them, the wish being the father to the thought. It is thus that one frequently sees several days wasted on the assumption that the fever is due to influenza or painful breasts and so on, when an unbiassed observer at once recognises the symptoms of puerperal infection.

The symptoms of puerperal sepsis vary immensely in different cases, the only feature absolutely common to them all being the presence of fever.

The character of the fever varies. It may be high and abrupt

from the first, or the acute rise may be preceded by an irregular pyrexia of lower grade for a day or two. In the so-called "sapraemic" cases it is moderate throughout, never rising above 101° F. Very exceptionally the period immediately before death is marked by a sub-normal temperature.

Changes in the lochial discharge are commonly, but not always, present. Under any circumstances, they rarely supervene until the fever has lasted a day or two, and the same remark applies to tenderness of the uterus, pain over the lower abdomen and rigors. It should be the aim of the obstetrician not to delay a working diagnosis until these absolute signs of infection are present, for it is better unnecessarily to treat a patient as for puerperal infection than to postpone remedial measures until the nature of the case becomes obvious to the least trained intelligence but the disease is too far advanced to be curable.

With these general remarks we may now pass on to consider in detail and criticise the means at our disposal for combating the disorder.

Uterine Exploration.—The first thing to do in an early case of puerperal sepsis is to explore the uterus under anæsthesia.

The only exception to this rule is when it is reasonably certain that the uterus is not involved in the septic process. It is not often that one can be certain of this; but when an obviously infected lesion exists lower down, as, for instance, a suppurating perineal laceration or an acutely inflamed pile, the uterus being at the same time firm, painless and normally involuted and the lochial discharge to all appearance normal, it is justifiable to first try what treatment of the obvious lesion will do. In such a case the perineal sutures must be removed, the vagina should be irrigated several times a day, and antiseptic fomentations must be applied every few hours to the perineal and anal regions.

In many cases, however, we have no sure means of ascertaining whether the uterus is or is not infected, and it is better therefore to treat all such on the assumption that they belong to the graver category.

No harm, in my experience, has ever followed uterine exploration properly carried out, but irreparable ill may result from delay.

The patient should lie on her back in the long axis of the bed. It is a mistake to place her on her side or in the lithotomy position, because in either of these it is much more tiring to make strong pressure on her abdomen. This strong pressure is a necessity to force the uterus on to the exploring fingers, for without it the longest fingers are unable to reach the top of the cavity.

It is an advantage to place her on a bed-pan or, better still, a douche-bath, so as to avoid wetting the bed, and it is convenient for



FIG. 1.—Introduction of one finger through the cervix.

the operator to sit on the right edge of the bed facing the patient, while carrying out the operation.

The whole of the gloved right hand without the thumb (unless there is room for it) is inserted into the vagina, and the first finger and subsequently the second are passed up the cervix into the cavity.

To explore the uterus efficiently and certainly to remove anything

from its cavity two fingers are a necessity. It often happens that at first the cervix feels too small to admit of more than one finger, but after a few minutes it will be found invariably that a second can be introduced. The uterus is firmly pressed down by the



FIG. 2.—Evacuating the uterus.

hand on the abdomen, and it is now that the advantage of the position I have described is felt, since it permits of one's weight being used instead of having to rely on muscle effort only (Figs. 1 and 2).

The whole surface of the uterine cavity is carefully explored, particularly the placental site, which is roughly scraped by the

gloved finger-nails. Small shreds and fragments of decidua, blood-clot or placental tissue can always be extracted from any recently

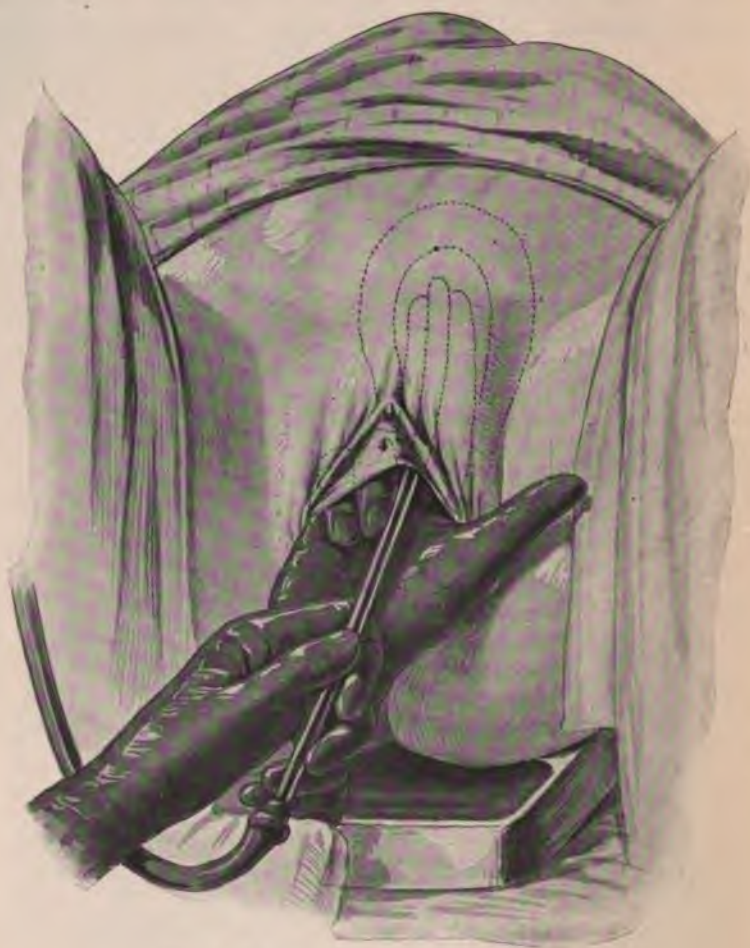


FIG. 3.—Passing the intra-uterine douche tube.

delivered uterus. At times the search is rewarded by the finding larger masses.

By a movement of the fingers in the cavity the fragments are passed through the cervix into the palm of the hand in the vagina. When the evacuation is complete, the fingers are withdrawn through the cervix and the intra-uterine douche tube is passed slowly into the uterus, which is then washed out with 2 or 3 quarts of biniodide of mercury solution (1 in 1,000) at a temperature

120° F. (Fig. 3). The tube being withdrawn, and all fluid having been squeezed out of the uterus, the external genitals are cleaned up, the soiled linen and douche-bath are removed, and the patient is allowed to come round from the anæsthetic.

The effects of this operation when performed early are, as a rule, most satisfactory. In many cases an immediate fall of the temperature to normal is the result, whilst in others a less rapid, but steady, improvement follows.

In some cases the operation is followed by an abrupt rise of temperature, ushered in by a severe rigor. The thermometer may register as high as 105° F., and the appearance of the patient is alarming. This sudden rise of temperature following the irrigation of a septic cavity is seen after similar procedures in other parts of the body, such as washing out the bladder for cystitis.

The occurrence, though disconcerting, is not serious, for the rise of temperature is merely temporary, and is followed in almost all instances by a rapid fall. The possibility of its occurrence should, however, be mentioned to those in attendance on the patient. The reason for the good effects of uterine exploration is not entirely clear, for it is certain that the operation leaves *in situ* such organisms as have already invaded the uterine wall.

A certain quantity of the organisms are, however, removed, together with fragments of placenta, decidua and blood-clot capable of forming an inert culture medium.

In addition, the drainage from the cavity is improved by the dilatation of the cervix, whilst the manipulation and hot douching increase the tone of the uterine wall.

Curettage of the Uterus.—The good results of uterine exploration are the more marked the earlier the case is taken in hand, but in patients who come under treatment when the disease is already far advanced it often fails altogether. As has been pointed out, the proceeding does not remove organisms that have already deeply invaded the uterine wall. In order to eradicate these, curettage of the uterus is advocated by some authorities.

Curettage to be successful must obviously be very thoroughly performed, for nothing short of the complete erasion of the infected tissue could attain this end.

The majority of obstetricians, amongst whom the writer is numbered, are not in favour of the practice, holding that complete removal of the infected tissue is impossible. Further in the attempt many blood and lymph vessels are opened up, and form potential channels for the further spread of infection.

The septic area in the uterine wall is bounded in the more

favourable cases by a zone of tissue infiltrated with leucocytes, whilst the veins proceeding from that area are thrombosed. These two factors tend to limit the process, and it is urged by those opposed to curettage that the operation tends to destroy this protective mechanism.

Those who practise it in preference to simple digital exploration point out the inefficient nature of the latter operation as far as concerns the actual removal of the infecting organisms. It is, however, doubtful if curettage ever really effects this in the sense of leaving a relatively sterile uterus at the conclusion of the proceeding, whilst the danger of breaking down protective thrombi and of opening up non-infected areas is very considerable.

There are those who would reserve curettage for cases, in which simple exploration has failed or the patient has come under treatment so late as to make it unlikely that the latter operation will succeed. I am of opinion, however, that most of these late cases are better not operated upon, and that if exploration has failed, curettage is not only very unlikely to succeed, but may be followed by symptoms of increased severity.

If the operation is performed, it must be very thoroughly carried out. A general anæsthetic is usually required, but when the patient's condition is very grave, analgesia by means of morphine and alcohol, as recommended by Japp Sinclair, may be tried. A very large, sharp curette is required (a blunt instrument does no more than the fingers), and the whole of the surface of the cavity of the uterus must be gone over carefully until a complete denudation has been effected. A good deal of bleeding follows. After the curettage the cavity is very thoroughly swabbed over with some strong antiseptic, such as tr. iodi, pure izal, lysol or cyllin, and is then packed with antiseptic gauze for twenty-four hours.

The proceeding, of course, necessitates much more skill than simple exploration, and the lithotomy position is required. The uterus should always be explored with the finger before proceeding to use the curette.

I am of opinion that in early cases exploration is always to be preferred to curettage, whilst in late cases, as a rule, no operation is indicated.

There are, no doubt, certain conditions in which the operation would be performed with success, but it is difficult to select them clinically.

Salpingectomy and Abdominal Drainage.—Active puerperal peritonitis is less common than passive peritoneal intoxication. In the former the classical signs and symptoms of peritonitis are

present, and in some cases a definite inflammatory tumour can be felt in the lower abdomen and pelvis. Puerperal peritonitis is secondary to puerperal infection of the tubes, and if the abdomen is opened the latter are found scarlet and swollen and exuding a thin pus from their coelomic ostia. The condition of the peritoneum varies. It may be merely injected without adhesions, or collections of pus may exist between the coils of intestine.

More commonly no active inflammatory phenomena are present: the peritoneum is either normal in appearance or dull and greyish, with ecchymosed patches here and there. In the various pockets, and especially in the pelvis, a blood-stained fluid is found which microscopical examination proves to contain vast quantities of organisms, usually streptococci. These cases are examples of infection without inflammation, for so overwhelming and virulent is the bacterial onslaught that the tissues are overpowered before they have time to react.

In many no suspicions of peritoneal involvement may have been aroused. There is neither pain nor tenderness, though some distension is usually present.

Puerperal peritonitis is nearly always fatal, passive peritoneal infection probably always so.

When the peritoneum is involved in the septic process, removal of the tubes as the route of the infection and free drainage of the peritoneal cavity is indicated.

The operation can be done under local or spinal anæsthesia, but the patients usually take ether or chloroform quite satisfactorily.

The skin having been cleaned up, a median sub-umbilical incision is made, and the uterus and appendages are exposed and examined. If the tubes are exuding pus through open abdominal ostia, they should be ligatured by a simple encircling ligature as far from their free end as possible and the distal portion cut off.

Exceptionally the pus is retained in the tube, the abdominal ostium having become occluded. In these cases they should be removed up to their junction with the uterine cornua.

The tubes having been removed, the pelvis is drained by a large tube passed through the lower end of the abdominal incision, and if the condition appears to warrant it, additional openings may be made over the iliac fossæ and the loin pouches.

Some surgeons also make an opening into the vagina at the bottom of the utero-rectal pouch and insert a tube through it; but it is questionable if this method has any advantages over abdominal drainage, while the opening is much more difficult to keep open and a tube there is not so easy to deal with.

Resection of the tubes and drainage of the peritoneal cavity is occasionally performed with success, especially if combined with continuous saline injection into the cellular tissue. Seeing that almost all cases of peritoneal infection die if left untreated, even a small percentage of success justifies the operation.

Drainage of the Pelvis by Vaginal Incision.—Instead of opening the abdomen, in these cases the peritoneal cavity may be drained through an incision in the posterior vaginal vault. The patient having been placed in the lithotomy position, the cervix is pulled down and the posterior fornix is incised with a scalpel until the utero-rectal pouch is opened. This is then mopped out with swabs mounted on forceps and a large drain tube is inserted.

This operation may be combined with exploration or curettage of the uterus under the same anæsthesia.

Certain Continental authorities practise plugging of both the uterine cavity and the utero-rectal pouch with iodoform gauze after the operations mentioned have been carried out.

The gauze used for the uterus should contain 10 per cent. of iodoform, that for the utero-rectal pouch 5 per cent. The former is removed in three days, the latter in seven days. This treatment has been well spoken of, but I have no personal experience of it.

Hysterectomy.—The removal of the uterus for puerperal and post-abortional sepsis has been carried out many times. Christiana collected 137 cases, with a general mortality of 63 per cent. When performed for puerperal septicæmia the mortality was 75 per cent., but post-abortional cases only showed a death-rate of 46 per cent.

The largest percentage of successes was obtained when the operation was done for such conditions as sloughing myomata or rupture of the uterus.

As the general mortality of puerperal fever is not more than 20 per cent., and in the worst cases not more than 50 per cent., it is obvious that the operation in question is, in the majority of cases, to be condemned.

Its ill-results are explained by a consideration of the pathology of the condition. If the mischief of puerperal infection were solely confined to the primary lesion in the uterus, the extirpation of that organ would be a rational method of cure. It has been shown, however, that in all the worst cases consecutive lesions in the peritoneum and the veins and lymphatics of the broad ligament exist, and it is to them rather than the primary lesion that the graver symptoms are due.

The extirpation of the uterus in these cases, therefore, not only

fails to remove the disease, but adds the shock of a major operation, **and** by opening up large areas of cellular tissue to the infective process and disturbing the protective thrombi in the veins of the broad ligament increases the danger. There are, however, three **con**ditions in which hysterectomy may be indicated in puerperal **seps**is: (1) When a sloughing myoma is present; (2) when in **add**ition to sepsis the uterus is ruptured; and (3) when a large **sol**itary abscess forms in the uterine wall.

In regard to the first of these, the liability for uterine myomata to become infected and necrose in the puerperium is well known. When a patient with a myomatous uterus has passed safely through labour, but during the course of the lying-in the tumour becomes tender and the temperature rises, operation should not be delayed. The removal of the uterus in these cases is to be carried out through an abdominal incision, and the entire organ must be removed. The subject will be further discussed when dealing with the treatment of puerperal infection from the clinical standpoint.

Rupture of the uterus is usually a disaster producing immediate symptoms. Many of these cases are subjected at once to hysterectomy. In others the rent is sutured either through an abdominal wound or per vaginam. Under certain circumstances, especially when the means of immediate operation are not at hand, the case is treated by simply plugging the aperture in the uterine wall and the cavity of the uterus with gauze. The last two methods of treatment may be followed by intra-uterine sepsis, and under such circumstances the removal of the uterus has to be taken into consideration. When an abdominal operation has already been performed and the wound in the uterus sutured, the second operation, if it is decided to remove the uterus, should certainly be carried out through the previous incision. In cases in which the rupture has been treated by gauze-packing, and especially if it is situated low down, vaginal hysterectomy may be employed.

Occasionally the fact that the uterus is ruptured or perforated is only discovered after the lapse of some days, in the course of exploration of its cavity for symptoms of puerperal or post-abortion sepsis. This is more commonly the case when dealing with criminally provoked abortion. Under such circumstances the uterus should be removed and the pelvis drained. Either the abdominal or vaginal operation may be practised.

Finally, hysterectomy is indicated when the uterus has been perforated in the course of digital exploration or curettage for septic infection. However much the necessity for the operation is to

be deplored, the leaving of an infected wound through the uterus into the peritoneal cavity would be almost certainly followed by fatal peritonitis.

Hysterectomy for rupture of the uterus complicating puerperal sepsis should always be total, and is best carried out through an abdominal incision, because the condition of the pelvis can be inspected, blood-clot, pus and infected serum can be better removed, and the parietal wound can be advantageously used for drainage. Finally, if thrombosis of the broad-ligament veins is detected, they can be ligatured beyond the thrombus, a proceeding impossible in vaginal hysterectomy.

Solitary abscess of the uterine wall is a rare condition. It is usually sub-peritoneal in position, and may form a large swelling. Its diagnosis is impossible, and most of the recorded cases have been mistaken before the operation for a pyosalpinx, an ovarian abscess or a loculated collection of pus in the peritoneal cavity, for which supposed conditions the abdominal cavity was opened. An abscess of the uterine wall having been discovered, it may be simply stitched to the abdominal wound, opened and drained, or the whole uterus may be removed.

Which of these two proceedings should be the one of choice depends upon the position of the abscess, and the condition of the rest of the uterus and the parts around. If the tubes are not infected, no extensive peritonitis present, and the sac easily brought to the abdominal wall, drainage should be employed, but when salpingitis co-exists and the uterus is surrounded by adhesions, or when extensive peritonitis is present, it is better to make a clean sweep of the uterus and tubes, and to drain the pelvis, both through the abdominal wound and the open vagina.

Ligation of the Pelvic Veins.—Ligation of the pelvic veins in puerperal fever was first proposed by Trendelenburg on the analogy of ligation of the internal jugular vein for lateral sinus thrombosis, the object being to prevent the absorption of toxins and bacteria into the circulation from the area of thrombo-phlebitis. The operation is still upon its trial, but a considerable number of cases have been recorded. Its *rationale* depends on the fact that in many cases of puerperal fever the principal consecutive lesion is a thrombo-phlebitis of the veins in the broad ligament, and particularly of the ovarian veins.

If this were the only lesion, ligation of the veins above the seat of inflammation would obviously be the treatment indicated. Unfortunately this is not so, for the majority of cases so affected also present diffuse lymphangitis of the pelvic cellular tissue and

peritoneal infection as well. Neither is it possible, even presuming that the spread of infection is solely by the medium of the veins of the uterus, to entirely cut them off from all communication with the general circulation.

A further difficulty arises from the fact that thrombo-phlebitis only exists in a proportion of the cases of puerperal infection, and that the clinical distinction of those that have it from those that have not is very difficult.

The most characteristic symptom of thrombo-phlebitis of the pelvic veins appears to be repeated rigors, and authoritative writers state that five rigors should have occurred before the operation is indicated.

In certain cases the thrombosed veins can be palpated through the abdominal wall as tender elongated swellings running out from the side of the uterus; but these are probably cases complicated by broad-ligament lymphangitis, which makes the operation less favourable than in those in which thrombo-phlebitis alone is present. V. Bardleben lays great stress on feeling the veins as an indication for performing the operation.

As the ovarian veins on both sides are usually affected, it is necessary to ligature both of them, whilst in a proportion of cases the uterine veins are also thrombosed, necessitating ligation of the internal iliac veins in addition.

As regards the ovarian veins there are two methods of applying the ligatures, extra-peritoneal and intra-peritoneal.

Extra-peritoneal ligation is the operation preferred by Trendelenburg, and is performed by an incision similar to that required for the old operation of ligating the common iliac artery. The peritoneum is pushed inwards, the vein found and traced upwards to its termination in the left renal vein or the inferior vena cava, and a ligature is then applied as high up as possible.

The majority of surgeons, however, prefer the intra-peritoneal method, which necessitates only one incision in the middle line, through which the internal iliac veins can also be ligated if desired. The abdomen being opened, the solidified ovarian vein is defined and the peritoneum just outside the root of the ovarico-pelvic ligament being incised vertically upwards, the continuation of the vein under the peritoneum is traced as high as possible, and a ligature placed upon it at that spot. The internal iliac veins are then exposed (if necessary on the side wall of the pelvis and similarly ligatured. It is not necessary to excise any portion of the veins, but it is essential to place the ligature above the thrombus.

It will be seen that the operation is one demanding a considerable

degree of surgical skill, especially if the iliac veins are ligatured, and, moreover, it is of some severity, especially taking into account the parlous state of the patient.

Von Herff collected thirty-seven cases with a recovery rate of 38 per cent., the best results being obtained in the more chronic cases. According to him, the intra-peritoneal method is much more successful than the extra-peritoneal. Marked signs of septic pneumonia or cardiac involvement contra-indicate the operation.

As has been said, the operation is on its trial, and at present the cases in which the operation is clearly indicated are few. These are cases with prolonged fever and recurring rigors, after every one of which the symptoms undergo exacerbation. If the thrombosed veins can be felt, the decision will be much easier. Large size and tenderness of the uterus, foul discharge and signs of peritoneal involvement, such as abdominal distension and pain, point to the symptoms being due to something besides thrombo-phlebitis, and therefore contra-indicate the operation: conversely, the absence of such features suggests its propriety.

Drainage of the Pelvic Cellular Tissue.—Although the pelvic cellular tissue, especially that of the broad ligaments, is usually more or less involved in puerperal sepsis, it is usually but a part of a more extensive consecutive lesion, of which the affection of the peritoneum and the veins draining the uterus is the more serious part.

In certain cases, however, broad-ligament cellulitis is the leading feature. These cases are less severe and of much better prognosis than those in which high fever and septic symptoms are unaccompanied by any definite inflammatory swelling.

Most cases of puerperal cellulitis go on to suppuration, and the abscess formed may be very large, the pus mounting up into the iliac fossa, and making its way under the crural arch or through the obturator and sacro-sciatic foramina into the thigh. In nearly all instances the abscess forms on the left side, and it is often associated with thrombo-phlebitis of the left femoral vein.

Cases of puerperal cellulitis require drainage of the cellular tissue tract involved. The incisions for this object should be made over the most prominent part of the swelling. Occasionally the mass can be best opened from the vagina through the lateral wall and fornix. More commonly the most accessible point is situated just above Poupart's ligament, on the abdomen, or further out near the superior iliac spine. The thigh, especially on its inner and back aspect, should always be carefully palpated, and if fluctuation is detected, an additional incision or incisions should be made there.

In a large abscess several openings and counter-openings will be required.

The operation is simple, the pus being usually struck at the first incision. If this is not the case, the blunt points of a pressure forceps or the finger-tip should be used to search for it. The openings into the abscess cavity should be free and the interior should be explored. Not infrequently several cavities are present. The pus having been evacuated and any necessary counter-openings made, drainage should be carried out by lengths of $\frac{3}{4}$ -inch rubber tubing. Subsequently the cavity may be irrigated with hydrogen peroxide solution (5 volumes) until fairly clean, when it should be allowed to close by granulation, the tubes being daily shortened.

Most of these cases make an excellent recovery, but death may occur from some associated lesion or from ulceration into the iliac or femoral artery. In the event of the last disaster the cavity should be plugged with gauze temporarily, and the common iliac artery ligated through an abdominal incision. Death is, however, almost certain.

Removal of a Pyosalpinx.—As has been shown, the Fallopian tubes are liable in puerperal sepsis to an acute ascending infection, which rapidly spreads *via* their lumen to the peritoneal cavity. The tubes in these cases are never occluded, and, indeed, very rarely in a condition of frank suppuration, the condition of infection without inflammation, already referred to, being present.

Occasionally, however, the infection is less fulminant, and results in the formation of pyosalpinx or tubo-ovarian abscess, usually on both sides. Such cases present the classical features of acute salpingitis and pelvic peritonitis, and a very definite swelling behind the uterus is formed after the lapse of a few days. It is important to distinguish the condition from broad-ligament cellulitis, from which it differs, in that the swelling lies behind the uterus, in or near the mid-line and in front of the rectum.

When a pyosalpinx exists, it must be removed.

NON-OPERATIVE TREATMENT.

The Identification and Isolation of the Causative Organism.

—It is of the first importance when dealing with a case of puerperal sepsis to identify and, if possible, to isolate the causative organism.

The elaborate apparatus required to secure a bacteriologically pure sample of the uterine contents is not obtainable in ordinary practice, nor is it necessary for the purpose in hand. A sterile swab, mounted on forceps and passed into the uterus or, if this is

not possible, into the vagina, will procure a satisfactory specimen of the lochial discharge.

The swab should be preserved in a sterile test-tube, and immediately forwarded to a competent bacteriologist.

Where the uterus has been explored, some of the contents removed from the cavity should be similarly preserved.

If the obstetrician has sufficient knowledge of bacteriology and possesses a $\frac{1}{2}$ th objective, an immediate determination of the nature of the organism can often be made. Several coverslips carefully cleaned with alcohol should be smeared with the lochia or uterine contents, dried and stained with methylene blue or by Gram's method.

If on examination streptococci are detected, the case is clear. In their absence it will be necessary to wait for the bacteriologist's report; but, at all events, the propriety of administering anti-streptococcus serum will be settled.

A bacteriological report founded on cultures takes twenty-four to forty-eight hours, whilst isolation of the causative organism in pure culture may take twenty-four hours more.

The latter is particularly important in view of the possibility of a vaccine being required, and the bacteriologist should be informed that this may be the case, so that he may preserve the pure cultures for the purpose.

Serum Treatment.—Though the hopes founded on the serum treatment of puerperal sepsis have not been fully realised, yet it is undoubted that in certain cases very favourable results follow its administration.

For this reason anti-toxic serum should always be given in the more severe types of the disease, and the more so because if no good is done, yet no harm will result from the administration.

Seeing that the majority of cases of grave puerperal sepsis are caused by the *Streptococcus pyogenes*, anti-streptococcus serum should be given whenever a definite bacteriological finding cannot or has not yet been obtained. Still more it is indicated when the presence of streptococci in the discharge is proved.

The dose given should be large; at least 20 centimètres is required for the first injection; this should be repeated in six hours, and again in six more. If at the end of this time no material change in the patient's state has been produced, its administration should be stopped as useless.

As it has been shown that a number of varieties of streptococci exist, *it is most important to use a polyvalent serum.*

The failure of anti-streptococcus serum to give a good result may

be due to the streptococcus not being the causative organism in that particular case, or, being the cause, yet of a different variety from that used in the production of the serum. Further, it is certain that in most of the fatal cases the patient has suffered from the combined toxic effects of several species of bacteria, the primary infecting organism being rapidly followed by secondary infection from the bowel and elsewhere. Lastly, it is probable that in the later stages of the disease the condition is the product of several factors, of which the poisonous products of the infecting bacteria are only one. As the investigations of Foulerton and myself showed that in the most severe cases *B. coli communis* co-existed in the uterus with streptococci, it appears rational to combine the administration of anti-*coli* serum with that of anti-streptococcus serum, even as a prophylactic, in those cases in which the streptococcus alone is found in the uterus.

The results obtained from anti-*coli* sera are not very good, unfortunately, even in pure infection by that organism; but, nevertheless, the combination mentioned is preferable in puerperal sepsis to the use of anti-streptococcus serum alone.

When the bacteriological investigations show a causative organism other than the streptococcus, such as pneumococcus or staphylococcus, the corresponding serum may be tried; but too much must not be hoped from these preparations.

As regards the effects of serum-therapy generally in puerperal sepsis, the cases may be divided into three groups: (1) Those in which an immediate and marked amelioration of the symptoms follows the infection; (2) those in which the patient manifests a certain slight improvement, or, at all events, ceases to lose ground; and (3) those in which the gravity of the symptoms increases, in spite of the treatment.

In the first case the continuance of the injections is absolutely indicated. In the second it is wise to continue them, for in this disease every day gained without further downward progress materially improves the prognosis. In the third the administration should at once be stopped, or either some other make or form substituted, or the use of serum abandoned altogether.

It is claimed by some that results equally as good as those obtained from subcutaneous injection follow administration by the mouth or rectum. Whilst it is preferable, in my opinion, to use the former method, the two latter are with advantage employed when a violent urticarial condition of the skin is provoked by subcutaneous injection.

Vaccine Treatment.—Though, like serum-therapy, the vaccine

treatment of puerperal sepsis has not fulfilled all the expectations at first formed of it, yet in certain cases excellent results have been obtained.

Vaccine treatment is rarely successful in high-continued fever with a general typhoid state, or when some gross consecutive lesion, such as peritonitis or cellulitis, is present. It is most likely to do good when long-continued fever with marked remissions exists, and the septic state of the uterus appears to be the principal lesion. The vaccine is preferably prepared from the causative organism previously isolated from the discharge or blood; but if this is not possible, a stock vaccine may be used instead. Much depends upon the size of the dose and its period of administration. (*See Vaccine Therapy*, Vol. III.)

Intra-uterine Douching.—Intra-uterine douching, though very commonly used in the treatment of puerperal sepsis, is not a satisfactory proceeding when used alone, and it should never be employed to the postponement of exploration under an anæsthetic, as is constantly done. This constitutes the gravest objection to its routine practice in cases of puerperal pyrexia. One constantly sees several days wasted in this inefficient proceeding, when the more vigorous method of treatment should have been adopted at once.

It is not easy to effectively wash out the cavity of the uterus especially in restive patients and when the uterus is very tender.

In puerperal sepsis the surface of the uterine wall is covered by a film of closely adherent blood-clot and coagulated serum, pus or necrotic tissue which completely protects the underlying bacteria from the effects of the chemical solution, and cannot be washed away.

The manipulation may dislodge thrombi in the uterine sinuses or the pressure of the douche may force septic material up the Fallopian tubes.

The proper time, therefore, to employ the intra-uterine douche is immediately after the uterus has been explored and whilst the patient is still under the anæsthetic. If uterine exploration has not been effective, the daily repetition of the douche will not improve matters, and may, as just pointed out, make them worse.

The solution used should be fairly strong, the best being that of biniodide of mercury (1 in 1,000).

The Application of Strong Antiseptics to the Uterus.—Many strong antiseptic substances have been applied to the interior of the uterus in puerperal sepsis. Amongst them may be specially named absolute alcohol, alcoholic solution of iodine

formalin and izal. The application can be carried out without an anæsthetic by means of swabs mounted on a long holder, but it is most efficiently performed under an anæsthetic after the uterus has been explored or curetted.

Of the various substances mentioned, alcoholic iodine solution is probably the best, but strong izal has been recommended warmly by some authorities.

For the reasons previously stated when dealing with curettage, I am not in favour of such measures, for although their action on the organisms in the cavity of the uterus cannot be gainsaid, yet to destroy those already in the uterine wall would involve injury to the tissues in which they lie. Were absolute sterilisation of the infected area possible by such means, this would not be a drawback; but the method fails even on a surface like the skin, the most favourably placed for the attempt. The gain, therefore, of the destruction of a partial number of organisms is much more than balanced by the injury to the tissues that it involves.

Vaginal Douching.—As already stated, I am strongly in favour of routine vaginal douching after all labours, when it can be skilfully carried out. Even those opposed to this practice admit its necessity in cases of puerperal sepsis. The retention in the vagina of a puddle of uterine discharge swarming with bacteria is obviously undesirable, especially when more or less breach of the surface from lacerations of the cervix and vaginal outlet co-exist.

It has been shown that in many of the slighter cases of puerperal sepsis these lacerations constitute the primary and only lesion, and in such frequent vaginal douching may alone effect a cure, whilst in intra-uterine sepsis such infected wounds add their quota to the general state of ill-being.

To be efficient vaginal douching should be repeated every four hours, in these cases the main object being to wash away the organisms rather than to destroy them *in situ*. For this reason the solution used should be dilute, so as to avoid setting up irritation of the parts. The particular antiseptic used is of less consequence. Bismiodide or perchloride of mercury (1 in 4000), lysol, or tincture of iodine (5j ad ʒij) [U.S.P. ʒ.20 ad ʒi.] or tartaric acid (5j ad ʒij) are all satisfactory.

The Administration of Saline Solution. The use of saline solution is indicated in many septic states, and is certainly employed in certain cases of puerperal fever presenting a grade of profound toxæmia, especially when accompanied by vomiting and diarrhoea.

In such patients a progressive use of fluid is necessary, with the

result that the percentage toxin content of the blood is continually rising. The administration of saline solution replaces the fluid lost and dilutes the bacterial poisons dissolved in the blood serum.

It is known that life may be maintained for several weeks without any food if sufficient water is supplied, and the practice of treating cases of gastric ulcer by rectal saline injections, all food having been withdrawn, illustrates the same point.

Moreover, a raised blood-pressure promotes transudation from the vessels rather than into them, so that the absorption of toxic products into the blood is hindered, and when drainage is established a free discharge of serum is promoted for their further elimination. Thus saline injection is particularly indicated after incision and drainage of the peritoneal cavity for puerperal peritonitis.

In puerperal fever saline solution may be administered either by the rectum or by injection into the cellular tissue.

As regards administration by the rectum, it may be periodically introduced by means of a long rectal tube with a glass funnel attached to it by means of a short piece of rubber-tube and a glass tube union. The fluid should be run in very slowly, about 6 oz. at a time, and repeated every four or six hours.

Instead of periodic introduction continuous saline injection into the rectum may be practised, the fluid being syphoned in at very low pressure.

So many cases of severe puerperal fever, however, present diarrhoea that continuous infusion into the cellular tissues is a better way of administering the saline solution.

The apparatus required is simple: A large beaker or jug to hold the solution, a yard of red rubber tubing ending in a T-shaped glass union, to which is attached two shorter pieces of tube bearing at their ends the hollow needles. In emergency the union is not necessary, one needle directly fixed to the long piece of tubing being sufficient.

Syphonage action having been established, the needles are inserted, one under each breast or into each thigh or flank, and the fluid is allowed to slowly run into the cellular tissue. The water head required is about 1 foot, and the rate of inflow should not exceed $\frac{1}{2}$ pint an hour.

The area adjacent to the needles should be watched in case it swells, in which event the inflow from that needle should be stopped for a while by clamping the rubber tube leading to it by a forceps. When two needles are in use, it is a good plan to let the stream run through them alternately. It is important to clean and sterilise the skin thoroughly before inserting the needles.

By means of continuous saline infusion a patient may be kept alive for days without any other means of sustenance.

Drugs.—Drugs are obviously of very secondary importance in the treatment of puerperal sepsis.

The most valuable is alcohol, in the form of ardent spirit or champagne. Next in order opium, its derivatives, and the various hypnotics may be named. These patients rarely sleep much, and in severe cases often exhibit a distressing condition of mental alertness. In such, sleep-giving drugs are indicated. Of this group "bromidia" in my opinion is the best; but sulphonal, trional, paraldehyde and veronal can all be tried, whilst morphia answers well in some cases.

In cases exhibiting much excitement bromides should be given, whilst in those in which a form of septic mania is present hyoscine may be necessary.

Strychnine and digitalin are resorts when the strength is failing, the first in particular; whilst ether and ammonia are indicated, if the respirations are much embarrassed.

Quinine is often given to reduce the fever, but its administration is illogical, and has nothing to recommend it. For the headache present in some cases aspirin or phenacetin may be given, but their continued use for the purpose of lowering the temperature is not advisable.

General Management and Nursing.—The general management of a case of continued puerperal fever is similar to that of severe sepsis from causes unconnected with labour. The temperature and pulse should be taken and charted every four hours, and the urine should be measured and examined daily.

The backs of these patients must be very carefully looked to, for bed-sores develop rapidly. The back should be washed with soap and water at least twice a day, or more often if necessary, and powdered with a mixture of starch powder, 3 parts; boracic acid, 2 parts; and oxide of zinc, 1 part. If there is incontinence of urine or diarrhoea, equal parts of zinc and boracic acid ointments should be first rubbed on before applying the powder.

The mouth also quickly becomes very foul. It should frequently be washed out with a mixture of boracic acid solution and glycerine (3 to 1), to which a little lemon-juice has been added. When the patient is too ill to wash her own mouth, it should be swabbed out with pieces of wool on forceps.

The diet must be fluid and easily assimilable, and should be administered every two hours if the patient is awake. It is often a difficult thing to get the patient to take sufficient nourishment,

but it is most important to maintain the strength as far as possible. When nutriment cannot be retained, saline injections, as previously described, must be relied upon. Though the temperature is rarely continuously maintained at a very high level, yet when it rises above 104° F. means should be taken to lower it by tepid sponging. A patient with a temperature over 103° F. should be covered by a sheet only.

The patient should be nursed in the raised posture as much as possible to promote drainage from the vagina, and to prevent gravitation of infected serum from the lower to the upper part of the peritoneal cavity. This position is best maintained by means of a large pillow or bolster placed under the patient's thighs, and retained there by two pieces of bandage sewn to either end of it and fastened to the upper bed-posts. The vagina should be douched at least four times a day, and the external genitals carefully washed with soap and water, swabbed with an antiseptic solution, and well smeared with the mixture of zinc and boracic acid ointments. If this is not done, the parts soon become very excoriated.

It is most important that the nurse, when performing these duties, should avoid contaminating her hands as much as possible; absolute protection can only be obtained by the use of rubber gloves. Failing this, she must very carefully wash her hands, and afterwards soak them in an antiseptic solution. The manipulations should be carried out by forceps whenever possible.

All pads applied to the external genitals must be immediately burnt after removal.

THE TREATMENT OF PARTICULAR CLASSES OF PUERPERAL SEPSIS.

Having now reviewed the various curative measures used in puerperal sepsis, it will be useful to consider them as applied to particular classes of case.

As follows from a study of the pathology of puerperal infection, great variations obtain in the clinical features presented by different patients. Whilst it is impossible to lay down rules of treatment applicable to all cases, yet a rough classification into clinical groups is feasible for this purpose.

Cases with Early Slight Fever.—Every case of fever in the puerperium should be considered as due to septic infection, unless it can be proved otherwise. There are only two forms of non-septic fever at all commonly met with in a puerperal woman, namely,

that due to reaction after a severe labour and that due to painful conditions of the breasts.

Reaction Fever.—After severe labours, especially in highly sensitive women, an abrupt but transient rise of temperature immediately after delivery is not uncommon. It rarely exceeds 100° F., and should fall almost immediately. Its cause is not known, but it may be analogous to the rise of temperature occurring in athletes after prolonged exertion, and produced by the absorption into the circulation of products of muscle metabolism.

It is most important to remember that "reaction fever" is always transient. If the pyrexia is maintained for more than a few hours, suspicions of acute septic infection during labour should at once arise.

Breast Fever.—The painful swelling of the breasts initiating lactation may be a cause of slight fever, but pyrexia beginning on the third or fourth day always suggests sepsis of the genital tract, and this hypothesis should not be lost sight of even when the breasts are very hard and painful. The fever produced by mammary irritation is never high; anything over 100° F. indicates a graver cause. Moreover, very tender, swollen breasts are continually seen without any fever. It is necessary to lay the greatest stress on these points in view of the frequency with which the early signs of puerperal infection are misinterpreted as being due to congestion of the breasts.

There is, however, a form of lobular mastitis occurring early in the puerperium which gives rise to marked fever. It will be referred to later.

Other Causes of Non-septic Fever.—No other cause of non-septic fever is at all common in patients who previous to the labour were healthy. Constipation is credited by some with the power of producing fever in the puerperium, but seeing that it has no such effect apart from it, the fact is much to be doubted. Puerperal women are not, of course, immune to the various acute infective fevers, but their occurrence at that time is very uncommon. Influenza and scarlatina are of special importance in this connection; influenza, because of the frequency with which fever subsequently proving to be septic is attributed to it, and scarlatina on account of its supposed relationship with puerperal fever.

As regards influenza, it must be borne in mind that the initial symptoms of puerperal sepsis, namely, headache, fever and general malaise, closely simulate that disorder, and that no such diagnosis should therefore be made except after strict examination and reasonable proof.

Puerperal women have been held to exhibit a special liability to

scarlatina, though the fact is not proved. The causative organism of this infective fever is not definitely known, but inasmuch as streptococci can be isolated from the throat, the possibility of conveyance of this organism is undoubted. Some forms of puerperal sepsis present a scarlatiniform rash, but such occurs in other species of toxæmias which have no possible connection with scarlatina.

Fever in the puerperium, associated with pulmonary signs, may be due to inter-current pneumonia or pleurisy quite independent of the recent confinement; but, on the other hand, such lesions are often secondary to primary genital infection.

In short, the practitioner will do well to recollect that on mere chance alone illness in a puerperal woman, who up to the time of her confinement was in good health, is most likely to be due to the confinement rather than to some accidental cause unconnected with it.

Given, then, that slight fever manifests itself in the first week of the puerperium, and that it appears to be due to septic absorption from the genital canal, the first point to be decided is whether the lesion is in the uterus or lower down.

It has been shown that in many of the slighter forms of puerperal fever the uterus is sterile, the condition being due to absorption from wounds in the cervix, vagina or vulva. This is especially the case after first labours, in which lacerations of the perineum and vaginal outlet are constantly present. Deep perineal tears approaching the anus, or actually extending into it, are apt to be followed by a good deal of inflammation, and if hæmorrhoids are present, as they often are, these become much inflamed and swollen also. In such cases some fever and constitutional disturbance is always manifested.

If in addition the uterus is firm, normally involuted and not tender, and the lochial discharge is natural, the symptoms are to be attributed to the laceration alone. In such a case all sutures in the perineum must at once be removed, the vagina should be douched several times a day, and warm boracic fomentations applied to the infected laceration. This is especially necessary if inflamed piles are present, and much relief will also follow the application of cocaine to them by ointment and suppository.

On the other hand, tenderness or abnormal size and softness of the uterus point to uterine infection, and this diagnosis is the more to be inclined to if the patient is a multipara, in whom lacerations of the lower tract are neither to be expected nor found. In the absence of indications in either direction it is better to treat the case on the graver assumption that the symptoms are due to

uterine infection. If uterine infection is diagnosed or suspected, the uterus should at once be explored under an anæsthetic in the manner already described, and a specimen of the lochial discharge should be obtained at the same time for bacteriological investigation.

The bowels should be opened and the patient should be propped up in bed to encourage drainage. The vagina should be douched three or four times daily with some weak antiseptic solution; but it is not advisable, in my opinion, to irrigate the uterus, even if the temperature does not fall after exploration of the uterus.

In this event it will be necessary to consider whether to pursue expectant treatment or to administer anti-toxic serum or a vaccine. The result of the bacteriological investigation and the condition of the patient will decide this.

Cases with Early Acute Fever.—Cases in which the temperature abruptly rises to a high level within the first few days after labour are nearly always due to streptococcus infection of the uterus, especially if the onset of the pyrexia is associated with a rigor.

Sudden and high fever is very unlikely to be due to infection of vaginal lacerations or prelactional swelling of the breasts. There is, however, a condition of the mammary gland known as "flushed breast," which does produce sudden elevation of temperature. It presents as a tender flushed patch, roughly triangular in shape, with its apex to the nipple, and is due to duct infection of the gland lobules. It quickly subsides with warm fomentations, and coincidently the temperature falls.

This cause of fever being excluded as well as any accidental condition not connected with the labour, it is reasonably certain that the uterus is at fault. In the early days of acute puerperal sepsis little or no physical signs may be present, but the uterus is usually tender on bi-manual examination.

Sepsis having been diagnosed, the uterine cavity should immediately be explored and anti-streptococcus serum given; a bacteriological examination of the uterine contents should be made as soon as possible.

The bowels must be opened, vaginal douches administered, and the patient should be sponged with warm water if the temperature reaches above 104° F.

If these means fail and the case passes into one of continued fever, it will have to be treated in accordance with the lines indicated in the next section.

Cases with Continued Fever.—When the case does not come under treatment until continued fever is established, the

importance of obtaining a bacteriological diagnosis is no less than in those seen at the onset of the symptoms. Samples of the uterine discharge or contents should be immediately obtained and investigated, and, in addition, in all severe cases the blood of the patient should be examined and cultured. To do the latter efficiently a considerable quantity must be withdrawn from one of the veins of the forearm, or, if these are not prominent, one of those on the back of the hand must be chosen.

The blood is withdrawn by a sterile syringe, the skin over the vein having previously been carefully washed and then scrubbed with absolute alcohol. The vein having been made prominent by compression above, the needle is driven directly into it in a slanting direction. When a bacteriologist is available, it is better that he should perform the operation, but, in his absence, the practitioner can do it, if he possesses an all-glass syringe capable of being boiled. The blood having been withdrawn is used to inoculate the culture tubes.

If these are not available, the syringe with the contained blood should be sealed with hot melted paraffin wax (a paraffin wax candle will provide this), and it should then be sent without delay to the bacteriologist with a request for a report on its bacteriology and opsonic index.

At the same time the ear of the patient should be pricked and several slides smeared with the blood in a thin film. This can be done by streaking blood over the surface of the slide by means of the edge of another slide or a cigarette paper.

These blood films will allow of an immediate report on the bacteriological content and leucocyte count.

The treatment of a case of continued puerperal fever depends in part as to whether it has already been operatively dealt with in the manner previously described, or whether practically nothing has been done beforehand.

When uterine exploration has been efficiently performed and failed, the question whether any advantage is to be gained by further intra-uterine treatment has first to be considered. Such treatment may take the form of a repetition of the exploration, active curettage, the application of strong chemical solutions, or iodoform gauze plugging. When a foul discharge from the uterus exists and the temperature is maintained at a fairly constant level, the absence of rigors and tenderness over the broad ligaments and of distension and rigidity of the lower abdomen negating the suggestion of thrombo-phlebitis or peritonitis, it may be advisable to re-explore the uterus, apply an alcoholic solution of iodine to its

interior, and plug it with iodoform gauze. Curettage I am not in favour of, for the reasons previously given.

On the other hand, evidence pointing to thrombo-phlebitis or peritonitis absolutely contra-indicates further intra-uterine manipulation, which can do no good, and may, by dislodging clots or disturbing adhesions, make matters much worse.

If no previous intra-uterine exploration has been made when the case comes under treatment, this operation is the first line of treatment that suggests itself. In general it may be said that the shorter time the symptoms have existed the more reason there is to explore the uterus, and that the indication is stronger when the uterus is unduly large and the discharge offensive.

After these late explorations, especially when nothing is found inside the uterus, the application of alcoholic iodine solution and iodoform gauze plugging is specially indicated.

There are certain cases in which no operative procedure is to be entertained, whether the uterus has been previously explored or not, namely, those in which high continued fever, diarrhœa, and a general typhoid state is combined with a uterus perfectly painless and a scanty non-offensive discharge. Most of these patients are going to die, and any operation merely accelerates the end.

They should be treated by continuous saline injection into the cellular tissue, anti-toxic serum, stimulants and opiates.

Cases exhibiting definite signs of peritonitis are comparatively uncommon. When such occur, pelvic drainage by abdominal incision is the proper course to pursue. Hot fomentations to the abdomen tend to relieve pain, while the flatulent distension is met by the use every six hours of the long rubber rectal tube.

If flatus does not pass freely, the bowel may be washed out with 2 pints of soap and water, to which is added $\frac{3j}{\text{}} of turpentine. The fluid is slowly run in through the long rectal tube by means of a glass funnel, 10 ounces at a time, and having been allowed to remain for a few minutes, the end of the tube with the funnel attached is lowered into a basin of boric acid solution. The turpentine solution as it runs out aspirates the flatus from the intestine above.$

The administration of eserine sulphate or salicylate (gr. $\frac{1}{100}$) every four hours stimulates peristalsis, as do intra-muscular injections of infundibular extract (pituitary extract), repeated at the same intervals.

The old fashion of giving repeated doses of purgatives, especially salines, is not to be recommended. It invariably fails to open the bowels, and merely increases the sickness and distress.

The strength of these patients must be maintained as much as possible. Mouth feeding is usually useless, but small quantities of brandy and water may be retained. Rectal injections or nutrient enemata, with brandy added if necessary, are valuable; but in desperate cases, both with peritonitis and without, nothing equals continuous saline infusion into the cellular tissue. It is especially indicated when both vomiting and diarrhoea exist and it is impossible by any other means to replace the fluid lost by the patient.

Evidence of thrombo-phlebitis would indicate ligation of the pelvic veins. The difficulty of being reasonably certain that such exists has been referred to. In a few cases the veins are palpable; more often their presence is inferred from the occurrence of repeated rigors and long-continued fever. It is of no use performing this operation when the uterus is very large and the discharge purulent or foul. It is most likely to succeed when no definite uterine or peritoneal signs are present; in short, when it appears probable that the inflamed broad-ligament veins are the principal lesion.

When signs pointing to pelvic cellulitis develop, the swelling should be incised as soon as possible in the manner previously described. Many of these cases also present femoral thrombo-phlebitis as well. The treatment of this complication will be considered in the next section.

The importance of obtaining a bacteriological report as to the nature of the infecting organism has already been insisted on. In all cases of continued puerperal fever anti-toxic serum should be given a trial. The subject of vaccine treatment has already been dealt with.

Cases in which Fever begins Late in the Puerperium.—When the symptoms of puerperal sepsis do not begin until the second week, they are probably due to inflammation of the pelvic cellular tissue or thrombo-phlebitis of the femoral vein.

Both these lesions are sometimes seen in the more acute cases beginning in the first week, but they then merely form a part of the general septic state, whereas in these late cases the inflammation tends to be localised to these parts and forms the principal feature of the illness.

The general treatment of late puerperal cellulitis is the same as that occurring early in the puerperium, but exploration of the uterus is still less indicated. Indeed, in many of these patients that organ is not obviously affected, the infection probably starting in some laceration of the cervix or vagina.

If cellulitis is present the abdomen should be fomented and the vagina frequently douched, and so soon as the swelling in the broad ligament is sufficiently defined it should be incised either from above or below.

It is important not to mistake a large pyosalpinx for the mass formed by pelvic cellulitis. A pyosalpinx, though occurring frequently after abortion and miscarriage, is less common after labour, for puerperal infection of the tubes usually extends directly to the peritoneum without occlusion of the ostia.

The distinction between a pyosalpinx and the mass of pelvic cellulitis is usually easy, the swelling in the former condition being more central and lying posterior to the uterus, which it presses forwards, whilst the latter is markedly lateral and usually limited to the left side.

If a pyosalpinx is diagnosed, the abdomen must be opened and the diseased tube or tubes removed. It should never be simply incised and drained *per vaginam*. Both tubes are usually affected, and the pus is often loculated. In either case it is difficult or impossible to completely evacuate it by vaginal incision, and the abdominal operation has to be resorted to in the end.

The most satisfactory period at which to operate on a pyosalpinx is a matter for nice judgment. In fulminant cases it cannot be delayed, but if possible it is better to allow the first fury of the symptoms to subside, when the removal of the pus-laden tubes is carried out with less risk. On the other hand, too long delay is disadvantageous, for the ovaries may become so disorganised that it is impossible to conserve them.

In the fulminant cases it is usually necessary to remove not only the tubes, but the whole uterus, and often the ovaries riddled by abscesses as well. The mortality after such operations is high.

In the more favourable cases in which it has been feasible to wait, it is often possible to remove the tubes alone.

During the waiting period the treatment consists in fomentations to the adomen, the use of eserine, pituitary extract, and the rectal tube to reduce flatulent distension, and an absorbable fluid diet.

The bowels are best relieved by a small enema every other day, and the patient should be nursed in the raised posture as much as possible. Morphia may be used cautiously, care being taken not to mask the symptoms.

Femoral Thrombo-phlebitis (Phlegmasia alba dolens, White-leg).—Femoral thrombosis usually occurs from the tenth to the fourteenth day after labour, and is frequently associated with pelvic cellulitis. It almost invariably affects the left leg, and is

ushered in by severe pain there, which is variously referred to the outer side of the thigh, the course of the vein, or the back of the knee and calf. The pain, with the fever that accompanies it, commonly precedes the swelling for a day or two.

The leg should be raised on pillows, and the thigh (and the calf, if necessary,) should be fomented. Morphia should be used to allay the pain, which is severe.

The blood should be examined for organisms, and if such are found, a vaccine should be made and administered. *B. coli* is probably the infecting organism in most of these cases. The limb should be kept very quiet for fear of detachment of the clot, though, as a matter of fact, this is a very rare accident, most of the cases of pulmonary embolism in the puerperium being preceded by no symptoms at all.

The Public Duty of the Medical Man.—*Notification.*—Puerperal fever is one of the notifiable diseases, but unlike the rest of those so scheduled, it is not, as has been shown, a single pathological entity. It is, therefore, difficult or impossible to define what is to be included under the denomination from the standpoint of the public health authorities.

In the widest sense every fever, no matter how slight, arising as a result of infection of the genital canal during labour or puerpery is in fact "puerperal fever."

Such an acceptance of the official term would involve an enormous increase in the number of notifications, and is obviously neither possible nor desirable.

Most practitioners only notify a case when a fatal ending appears possible, or when assistance from the public authorities has to be sought for purposes of hospital accommodation or transport by ambulance.

I am myself strongly of opinion that puerperal fever should be deleted from the list of notifiable diseases. The object of notification is to facilitate the segregation of cases of disease infective to the community at large, to enable the sanitary authorities to take steps to disinfect the dwellings of such patients, and to permit of better investigation into the causes underlying the occurrence of epidemics.

In all of these particulars notification fails in the case of puerperal sepsis, and its only effect is to cast an often unmerited stigma on the obstetrician, and a consequent disinclination to comply with the law, or even to recognise the disease unless it becomes extreme.

In view of the bacteriology and pathology of childbed fever there is much less reason for its notification than in the case of wound

sepsis after surgical operations, an occurrence far more within the control of the medical man.

Notification is, in fact, a remnant remaining from the days when the disease was held to be due to some mysterious contagion, the method of whose spread was unexplained and unpreventable.

As the law stands, however, it is the duty of the medical man to conform with it as far as may be reasonable. The exact interpretation of this view is difficult, but I think it may be accepted that when by reason of the bacteriological examination and the clinical picture it is apparent that the patient is suffering from infection by a virulent organism, the case should be notified as one of puerperal fever.

Much more important than the matter of notification is *the question as to how far it is safe for a medical man in attendance on a case of puerperal sepsis to attend another confinement.*

It is shown conclusively that the conveyance of the disease from patient to patient is only possible by actual transport of the organisms on the person, clothes, or appliances of the obstetrician. Such conveyance is, of course, entirely preventable, and given that he preserves both ordinary and surgical cleanliness, wears rubber gloves and sterilises his appliances, the possibility of the disaster is out of the question.

On the other hand, he has to consider that should a second case of puerperal sepsis occur in his practice, the public will be very apt to attribute the misfortune to him, whatever its real cause. And, further, in the event of such a mishap he himself, however unreasonable the thought, may be unable to dismiss from his mind the idea that he was the agent, and thus both his reputation and his peace of mind may undeservedly suffer.

Therefore I think that, however unreasonable temporary abstention from further obstetric practice may appear from the standpoint of pathology, the medical man will be consulting his own interests best by refusing to attend other confinements, while a case of grave puerperal infection is on his hands.

VICTOR BONNEY.

REFERENCE.

- ¹ Foulerton, A. G. R., and Bonney, Victor, Trans. Obstet. Soc. London, 1905, XLVII., p. 11.

PULMONARY EMBOLISM.

THE prophylactic treatment is important and will be first considered.

Pulmonary embolism is almost invariably the result of blocking of the pulmonary artery by a portion of clot detached from a thrombus in the veins of the pelvis or lower extremities.

It is becoming more and more the opinion of surgeons and obstetricians that thrombosis of the pelvic veins is a result of septic infection, and its prophylaxis is to be found in scrupulous attention to the means of procuring *asepsis*; in this connection the wearing of rubber gloves for all obstetric manipulations is strongly advocated.

It has been urged that patients should be allowed to get up on the second or third day after parturition, and one of the principal arguments used in favour of this early rising is that it prevents thrombosis in the veins of the pelvis and lower extremities; this is doubtful, and, even if it were so, the disadvantages of shortening the lying-in period to this extent more than counterbalance its advantages.

Thrombosis is favoured by an excess of calcium salts in the blood, and this excess may be brought about by a too exclusively milk diet; on the other hand, citrates and citric acid diminish the coagulability of the blood, so that, if a patient has had thrombosis previously or if any sign of clotting appears, milk should be excluded from the diet, and citric acid, sodium citrate or lemon juice should be at once administered.

Injection of perchloride of iron to arrest post-partum hæmorrhage has been known to cause pulmonary embolism, a portion of the clots formed in the uterine sinuses being detached and carried to the lung. This is a method of treatment which should be regarded as obsolete.

It has been found in many of the recorded cases of pulmonary embolism that the attack has followed some movement, as rising from bed or straining in defæcation. In any case in which there is evidence of clotting in the veins of the pelvis or lower extremity the patient should be kept at rest in the recumbent position, until all pain and tenderness in the affected limb have disappeared and the vein can no longer be felt to be hard and tender; this will

usually be at least five or six weeks. Care should be taken that no risk is run of detaching clot by moving or rubbing the limb.

It is also desirable to keep a longer time than usual in bed all cases in which there has been exhaustion from hæmorrhage or which have shown evidence of sepsis, as it is in these cases that thrombosis and embolism are particularly apt to occur.

The vessels of the lower lobe of the right lung are those most frequently affected. Death may be caused suddenly by syncope or later by asphyxia; if recovery from the immediate effects ensues, there is hæmorrhagic infarction with pleurisy and pneumonia, or pulmonary abscess may follow.

If the embolus is small and non-septic, fairly rapid recovery may follow; but small septic emboli may lead to pyæmic abscesses in the lung, and a long and ultimately fatal illness may be brought about.

Treatment of an Attack.—The first essential is to keep the patient absolutely and completely at rest; the slightest movement may cause a fatal attack of dyspnœa.

A diffusible stimulant should be given, either ammonia (20 min. of liq. ammoniæ) [U.S.P. aquæ ammoniæ] or 5 gr. of ammonium carbonate in 1 oz. of water; or ether (20 to 30 min.) in 1 oz. of water or, if the patient cannot swallow, 20 min. of ether may be injected hypodermically. A subcutaneous injection of morphia ($\frac{1}{4}$ or $\frac{1}{2}$ gr.) should also be given. Inhalation of oxygen, if it is at hand, should be administered, and, if there is much cyanosis, venesection to the extent of 15 or 20 oz. will give relief, or leeches may be applied to the chest.

It has been suggested that the chest should be opened and the pulmonary artery incised and the clot withdrawn; this has been tried but not, hitherto, with a successful result.

C. E. PURSLOW.

TETANUS.

TETANUS is a very rare complication of the puerperium. The germ resides in the soil and may gain access through a wound or it may gain entrance to the intestinal canal by being ingested with uncooked food products. It has also been stated that the use of catgut in suturing wounds may convey the infection, and that a newly plastered room may be a source of infection. Tetanus neonatorum has been attributed to infection of the stump of the umbilical cord by the fuller's earth used, and it is a wise safeguard to see that fuller's earth is always baked before use. These remarks will suggest the little that can be done in the way of prophylactic treatment.

The mortality and severity of the disease vary with the length of the incubation period; the shorter the latter, the worse is the prognosis.

The patient should be kept in a darkened room and in absolute quietude; abundance of fluid should be given and as much easily digestible liquid food as the patient can take. If swallowing is impossible, both fluid and food should be given per rectum. A draught of chloral hydrate (15 gr.), potassium bromide (30 gr.) in 1 oz. of water, should be given at once and repeated every two hours for three or four doses; if this cannot be swallowed, twice the amount should be given as a rectal enema. Inhalation of chloroform to check the spasms has been found beneficial and may be employed in severe cases. Saline enemata have been found to do good.

Anti-tetanic serum should be procured as soon as possible and injected in doses of 10 to 20 cubic centimètres. The site of the injection may be the subcutaneous tissue of the abdominal wall or flank, or better still, if the practitioner is able, he should inject it into the sub-arachnoid space in the lumbar region of the cord, first withdrawing a small quantity of cerebro-spinal fluid. It has been injected into a vein, into the cranial cavity, and into the nerve communicating with the site of contagion, when the latter is known.

A treatment which has been highly praised and which has the powerful recommendation that it is always within reach is the administration of *magnesium sulphate*, either by subcutaneous injection or, in what is probably a much more efficacious manner, by spinal

injection. For subcutaneous injection it is advised that 10 cubic centimètres of a 10 per cent. solution should be injected every four hours. In the case of intra-spinal injection 1 cubic centimètre of a 25 per cent. solution should be injected for every 25 lb. of body weight; this would mean about 5 to 6 cubic centimètres for an average adult. The following is the method of performing lumbar puncture: The injection is usually made between the spines of the fourth and fifth lumbar vertebræ, and the landmark for this is obtained by drawing a transverse line across the back on the level of the highest points of the iliac crests; this level marks the spine of the fourth lumbar vertebra and the needle is entered immediately below this; the needle should be about 3 inches in length and cerebro-spinal fluid will drop or spurt from it when it has entered the theca spinalis. The greatest possible care must be taken to ensure asepsis when performing this operation.

The above is the line of treatment advised; the following drugs and methods have also been suggested: (1) Paraldehyde in 5j doses every four hours; (2) morphine by hypodermic injections in doses of $\frac{1}{4}$ gr., repeated three or four times in twenty-four hours; (3) curare, *sub cute*, in doses of $\frac{1}{12}$ to $\frac{1}{6}$ gr., the total not exceeding 1 gr. in twenty-four hours; (4) cocaine or eucaïne ($\frac{1}{2}$ gr.) by intra-spinal injection; (5) subcutaneous injection of atropine, when there is much secretion of saliva and mucus; (6) chloretone in 30-gr. doses by the mouth, dissolved in spirit, or 60 gr., dissolved in olive oil, as a rectal enema; (7) precipitated sulphur in 5ij doses repeated four-hourly and given in treacle.

A treatment largely used by Italian observers is the subcutaneous injection of carbolic acid (1 cubic centimètre of a 5 per cent. solution) every two hours for several days. Intra-spinal injection of 10 cubic centimètres of a 5 per cent. solution has also been tried.

C. E. PURSLOW.

TETANY.

TETANY was first described in puerperal women by Trousseau. It consists in painful tonic spasms of the extremities, more especially the hands, but has been known in rare cases to affect almost all the muscles of the body. The attacks are intermittent and last a short time, but may be repeated for several weeks. The contraction is preceded and followed by numbness and tingling. The attitude assumed by the hands is characteristic, and is due to spasms of the interossei muscles. The condition is diagnosed from tetanus by the intermittency of the spasms, by the absence of pyrexia, and by there being no serious constitutional symptoms.

Among predisposing causes have been mentioned excessive vomiting in the rare cases in which it has occurred during pregnancy, and prolonged lactation in puerperal women. Cases of recurrence in successive pregnancies have been reported.

The child should be weaned, and the general health of the patient should be attended to by giving nourishing food, fresh air, sufficient rest in bed. Potassium bromide is the drug most likely to benefit. When the spasms have been severe and widely spread, inhalation of chloroform has been advised. Calcium chloride in 10 to 20-gr. doses has been advised, and para-thyroid extract has been given with good result.

C. E. PURSLOW.

URETHRITIS.

URETHRITIS may be associated with cystitis, but in most cases it is of gonococcal origin, and is not necessarily followed by cystitis, as, fortunately, in many cases the infection remains limited to the urethra and does not extend up to the bladder, the frequent washing out of the urethra by the stream of urine saving the bladder from infection.

If gonorrhoeal urethritis exists at the time of labour, great care must be taken to avoid infecting the uterus during digital examination; the pus must be squeezed from the urethra and its orifice wiped with an antiseptic, preferably mercuric perchloride (1 in 2,000), and the urethral area should be covered by a swab wrung out of the same solution while a digital examination is made; also, vaginal examinations should be made as seldom as possible.

The treatment of this affection, as regards general lines, follows that of cystitis, viz., rest in bed, light diet, avoidance of alcohol and the administration of plenty of bland unirritating fluids, such as barley water. In the acute stage the alkaline mixture prescribed for cystitis may be given. Later, sandalwood oil in 10 to 20 min. doses in capsule may be given, or the following mixture: *Ol. Santal Flav.*, ℥20; *Mucilag. Acaciæ*, ʒj; *Aq. Camph.*, ad ʒj [U.S.P. *Ol. Santal*, ℥20; *Mucilag. Acaciæ*, ʒj; *Aq. Camph.*, ʒij; *Aquam*, ad ʒj], every four hours; or *Olei Copaibæ*, ℥20; *Mucilag. Acaciæ*, ʒj; *Aq. Cinnamomi*, ad ʒj, every four hours; or *Urotropin*, gr. 10 in 2 oz. of water, every four hours.

If these means fail, applications to the urethra may be used. These are best applied on a Playfair's probe wrapped in cotton-wool. The application should be made by a Kelly's cystoscopic speculum, which is passed up the urethra, stopping short of the bladder, and then gently withdrawn. During the withdrawal the urethra wall is gradually exposed in its whole length and may be treated. The solutions used for this purpose are: *Argenti Nitratis*, 5 per cent. solution; *Protargol*, 10 per cent. solution; *Argyrol*, 10 per cent. solution.

Some advise the use of urethral bougies, 1½ inches long, containing 5 per cent. protargol. These are passed into the urethra and left there, the patient being directed to refrain from passing water for two hours.

C. E. PURSLOW.

AFFECTIONS OF THE BREASTS DURING PREGNANCY AND THE PUERPERIUM.

MANAGEMENT OF THE BREASTS AND NIPPLES DURING PREGNANCY.

THERE is not very much to be said about troubles connected with the breasts and nipples during pregnancy.

Crusts of dried secretion, branny scales which form on the nipples, should be removed, since if they are allowed to remain the epithelium under them becomes thin and tender, and a sore nipple is likely to result when suckling begins.

If the crusts are recent, they may be removed by bathing, but if they have been in position long, a fomentation of warm olive-oil should be applied to soften them and bring them away without making the nipple sore.

Some authorities advise that the nipples should be bathed with spirit and water during pregnancy, with a view to hardening them, so that they can withstand the friction connected with suckling, but it is possible that if the skin is hardened it will crack more readily. Consequently others advise that if anything is put on the nipples during pregnancy it should be some such substance as lanoline, which will make them more supple.

I am not much in favour of the spirit-and-water treatment. If the nipple is healthy to start with, all that is required is the removal of crusts as soon as they form.

The treatment of **depressed nipples** should be started during pregnancy, the nipples being drawn out very gently with the finger and thumb, while the surrounding areola is pressed back. If a little lubricant, such as lanoline, is rubbed in first, the nipples will not become sore from these attempts to draw them out. For this purpose also a nipple-shield may be worn for a few hours daily towards the end of pregnancy. Care must be taken that the corsets do not compress the nipples.

If the breasts are large and pendulous, the patient may find that a breast-bandage worn during the later months of pregnancy gives relief from the sensation of dragging and aching.

TREATMENT OF THE BREASTS WHEN THE PATIENT IS NOT GOING TO SUCKLE HER INFANT.

If the child is still-born, or it is decided for any reason that the mother is not to suckle it from the beginning, the breasts should

not be allowed to fill with milk. Some women in such circumstances suffer little or no discomfort, the activity of the breasts being very slight; but in most cases, if nothing is done to check the secretion of milk, the breasts become hard and painful, and there may be a good deal of constitutional disturbance. A firm breast-bandage should be applied over cotton-wool as soon after the end of labour as is convenient, and kept on for several days to prevent an increased flow of blood to the breasts. A fairly thick pad of cotton-wool is applied between the breasts and others on the outer side of each breast, while a thinner layer covers the breasts themselves, so that pressure can be applied evenly. The nipples should not be firmly compressed. The skin should be powdered thoroughly before the cotton-wool is applied, otherwise it may become sore, especially if the patient is fat. A broad, rib-roller bandage should be applied over the cotton-wool from the waist upwards. The patient is told to drink no more fluid than is absolutely necessary, and her bowels are opened by saline aperients. As a rule, when this treatment is adopted, she suffers no more than discomfort from her breasts, and application of belladonna is seldom, if ever, necessary. In some cases, however, when this treatment has been carried out, there may be swelling of the breasts with severe pain, sometimes causing a considerable rise of temperature. Some writers advise that in such a case the bandage must not be loosened, the patient being told to bear the pain; but I consider this to be unnecessary cruelty, and should advise removal of the bandage, application of fomentations, and then re-bandaging as tightly as the patient can bear it without causing pain. The use of a breast-pump in such cases is bad treatment, secretion of milk being stimulated by the pump.

If the patient has suckled her infant for a day or two and it is then decided that suckling must cease, the same treatment should be adopted, but it may be necessary to use a breast-exhauster if the breasts become much distended, and to apply glycerine of belladonna. A breast-exhauster, the suction being applied by the nurse's lips through an indiarubber tube, causes less pain than does a breast-pump.

PAINFUL ENGORGEMENT OF THE BREASTS.

In primiparæ the breasts sometimes become engorged or "caked" on the third or fourth day after delivery. They become swollen, hard, knotty and exquisitely tender, and there may be severe pain, usually most marked in the most dependent parts of the breasts towards the axillæ. There may be a good deal of distress

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accompanying this condition, and a rise of temperature up to 102° F. or higher. The breasts may be so tender that the patient will not allow the child to be put to them, or an exhaustor or pump to be used.

The occurrence of this painful engorgement points to neglect on the part of the nurse or of the mother. During the first twenty-four hours the infant should be put to the breasts for a few minutes eight-hourly, during the second twenty-four hours six-hourly, and after this every four hours until the flow of milk is established, when the child should be suckled at intervals of two hours, the breasts being used alternately. The breast should then be emptied at each feed.

Should the engorgement occur, any crusts that have formed on the nipples should be removed by soaking in warm olive-oil, and large fomentations should be applied to the breasts. The nipples must not be covered by the fomentations, or they will get sodden and liable to become sore. While they are being fomented, the breasts should be slung up, the aching being much diminished when they are not allowed to sag towards the axillæ. If the bowels have not been well opened, a saline aperient should be given. As a rule fomentations quickly relieve the pain and tenderness, and the breasts become softer and can be emptied by the infant or by a breast-pump. If the breast is very full, the nipple may not be sufficiently prominent for the child to seize it, and a nipple-shield may be necessary until the breast has been emptied. Fomentation of the breasts should not be repeated unless absolutely necessary, as it would tend to diminish the flow of milk.

Massage of the breasts is often recommended for this engorgement, but must be given with extreme gentleness, as injurious rubbing might injure the breast and possibly cause an abscess. Fairly firm rubbing may be used later on if hard lumps form in the breasts, due to local accumulations of milk; but in the case of painful engorgement the best way to apply massage is by gentle stroking towards the nipple by an oiled finger-tip.

There may be a mass of accessory mammary tissue near the breast, in the axilla or even on the upper arm, which becomes swollen and tender during the first few days of lactation. If it causes much discomfort, it should be fomented.

DEPRESSED NIPPLES.

Some depressed nipples are only slightly prominent—others are inverted, depressed below the level of the surrounding areola. Attempts should be made to draw them out by gentle traction with the fingers or with a breast-pump. Sometimes the rather quaint

expedient of borrowing a strong baby is resorted to. This would not commend itself to all mothers. If the nipples still remain depressed or very short, a nipple-shield must be used; otherwise the child will constantly lose hold of the nipple and seize it again, and the nipple will probably become sore. The shield should be made of glass, with an indiarubber teat, and kept perfectly clean. In most cases the flow of milk will gradually cease if a nipple-shield is used permanently, but sometimes the nipple may be gradually drawn out until it is sufficiently prominent for the child to grasp it.

If the nipples are less prominent than is normal, the infant should not be given a bottle; if any supplementary feeding is necessary during the first few days, it should be done with a spoon, otherwise the infant will find it so much more difficult to extract milk from the breast than from the bottle that he will refuse to take the breast.

Sometimes apparent depression of the nipple is really due to a bulging of the surrounding areola, and disappears when the mother is shown how to depress the latter and make the nipple stand out by pressure with two fingers, one above and the other below the nipple.

In cases where the nipples are really depressed below the surface attempts at suckling have usually to be given up after a few days' trial, the mother and the nurse becoming worn out by repeated failures, the infant becoming more and more querulous and refusing to make efforts which do not result in its securing a sufficient amount of nourishment.

It is possible that some inverted nipples are due to the ill-advised attempt of an old-time midwife to "draw out the nipple-strings" of a new-born infant, the damage to the breasts resulting in the formation of fibrous tissue which draws the nipple inwards.

SORE NIPPLES.

Sore nipples are not very often seen, when the patient and her infant are looked after by a careful nurse. Before suckling, the nipple should be bathed and dried. After suckling it should be bathed, dried and a small piece of lint or an absorbent pad applied to it; neglect of these simple precautions renders the mother liable to sore or cracked nipples. Sometimes the nipple is deeply fissured before suckling begins, and rather prone to develop cracks. The infant's mouth should be swabbed out with boracic-acid solution before and after suckling. Frequent, prolonged and fruitless sucking at the nipple before the flow of milk is established accounts for some cases of sore nipples. Another cause is found in the fact that the child is allowed

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to go to sleep with the nipple in its mouth, the epithelium becoming sodden and soft. Neglect of the nipples during pregnancy, crusts of dried secretion being allowed to remain on them, with the result that the underlying epithelium is tender and thin, is a predisposing cause. If the child lets go the nipple frequently to take a breath and then seizes it again, on account of nasal obstruction by "snuffles" or because it gets its nose buried in the areola surrounding the nipple, the increased friction may make the nipple sore.

Cracks in the nipple may cause very severe pain to the mother, and may act as the entrance-point for organisms, leading to mastitis.

If the nipple is only superficially sore, "chapped" or "chafed" without any deep crack, application of glycerinum boracis [U.S.P. borax, 20 gm.; glycerin, 120 c.c.], with a few hours' rest and use of the nipple-shield for a few feeds, may allow it to heal; but a compress of perchloride of mercury solution (one part in one thousand) seems to be the most satisfactory method of treatment.

If the sore does not heal, or if a deep crack appears, the nipple must be given twenty-four hours' rest, the crack being treated with tinct. benzoin. co. or with equal parts of glycerinum acidi tannici and 1 in 20 carbolic acid solution, a nipple-shield being used for a time when suckling is begun again.

If in spite of all treatment the crack persists and becomes deeper, it will probably be necessary for the mother to give up using the affected breast.

If the slightest tenderness is treated at once by rest and perchloride of mercury solution, the nipple is not likely to become cracked.

Application of boracic powder to a cracked nipple is not to be recommended, since the secretion forms with the powder a sort of poultice and renders the nipple sodden.

MASTITIS.

The most important point is that treatment should be begun early, neglected cases requiring long-continued treatment, and resulting in destruction of a large part of the breast.

Inflammation of a mild degree, producing what is sometimes known as "flushed breast," one segment of the breast being hot, red and tender, may disappear rapidly when treated by rest and fomentations.

If the inflammation is more severe, the breast should be fomented and slung up, and the arm bandaged lightly to the side. Suckling with the affected breast must be discontinued, and a careful watch

kept for signs of suppuration. It is a great mistake to wait for fluctuation before making an incision into the common intra-mammary abscess; œdema, a sign of the presence of deep pus, is found long before the pus has come near enough to the surface for fluctuation to be obtained. The abscess may be superficial to the breast tissue, in which case it is usually small and situated close to the nipple. The most common situation is in the breast tissue, an intra-mammary abscess; probably all early cases, *i.e.*, cases of abscess occurring within the first week or ten days, are intra-mammary. Some of the later abscesses, due to septic matter entering a crack of the nipple, may be superficial or deep, under the breast, but these also are most commonly intra-mammary. Early incision is imperative, as with delay more and more tissue on each side of the original abscess becomes affected. In neglected cases, and in those in which the pus has been allowed to point and burst into a septic poultice, the breast may be riddled with sinuses, and the patient's general health suffers from toxæmia. For the **supra-mammary abscess** a simple incision is usually sufficient, with insertion of a small drain if necessary. For an **intra-mammary abscess** one or more incisions should be made under anæsthesia, in a direction parallel with the large ducts, *i.e.*, radially from the nipple, over the part where œdema or fluctuation is most marked, a finger-tip introduced to break down softened tissue, and a drainage tube inserted. An incision made in any other direction would be likely to sever one of the large ducts. If incision into the abscess has been made in good time, the result may be excellent, the tube being found to be unnecessary after a few days, and healing taking place rapidly, while the patient is able to continue suckling with the other breast. In neglected cases several incisions may be necessary, sometimes fresh incisions on successive days, until half a dozen or more have been made. Sinuses must be opened up freely. Meanwhile perchloride of iron and full feeding must be given to counteract the anæmia and cachexia which are usually present in such cases. For an **infra-mammary abscess**, a comparatively rare condition in which diagnosis is usually easy on account of the whole breast being lifted away from the chest-wall, an incision should be made at the lower and outer margin of the breast, where the pus would probably point if no incision were made, and a large drainage tube inserted. It is surprising how well the breasts recover in some cases where there has been apparent destruction of a large amount of its substance, the patient being able to suckle, after subsequent confinements, with the affected breast just as well as with the other. In some cases, however, the patient finds that she is never able to use the breast again after a severe mastitis.

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GALACTOCELE.

A galactocoele or milk-cyst, not a very common condition, resulting from blocking of a duct, is usually situated near the nipple. The treatment is incision, followed by drainage or packing. The walls of an old galactocoele may be very thick and indurated.

H. RUSSELL ANDREWS.

THE MANAGEMENT OF THE NEWBORN CHILD.

GENERAL CONSIDERATIONS.

It is a great mistake to tie and cut the cord before it has ceased pulsating, as by so doing the child is robbed of a certain amount of ~~u~~seful blood. It is also a mistake to slap the child and try to make it breathe before the air passages are free from mucus. As the first breath is inspiratory, it may draw any mucus which is present into the lungs and cause asphyxia. The nose and mouth are wiped out with pledgets of moist cotton-wool wrapped around the little finger, and the eyes are wiped, from without inwards, before they are open, with other pledgets of cotton-wool. These details are best attended to between the birth of the head and the birth of the shoulders.

After tying and cutting the cord, the child is wrapped up and put to one side until the completion of labour, when the nurse has time to bathe it. It is important to regulate the heat centre at this early period. If the newborn child is kept too warm, it will have greatly diminished powers to resist cold. Cold air makes an infant cry lustily, thus causing proper inflation of the lungs. Indeed, no child should be laid aside until it has cried lustily, as otherwise it may suffer from atelectasis.

Therefore, while waiting for its first bath, the child need not be wrapped up too warmly. A piece of unbleached calico is sufficient covering.

Bath.—Many obstetricians advise that the child be given its first bath before the afterbirth has come away. The reason for this is that after labour is completed the mother is likely to be neglected for the child and serious symptoms of hæmorrhage and embolus may arise unperceived by the nurse, who is busy bathing the child. It is to enable the nurse to give her undivided attention to the patient after the doctor has left that bathing the child during the third stage is advocated. The objections are that the nurse does not like to be watched and therefore will not do it at this time unless told to, and leaving the child undressed and free to kick about is probably advantageous. It also exercises the heat centre.

In preparing to bathe the child the nurse should first get everything ready and should not go about the room collecting materials

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with the child under her arm. The bath is placed on the floor near the fire, the nurse sitting on a low stool beside it. The temperature of the water in the bath should be about 90° F. Nurses' hands are notoriously insusceptible to hot water and a bath thermometer should be used. If it is not available, the proper heat of the water is best judged on the bared elbow. At the time the child is put into the bath the cord is carefully inspected to see if there is any bleeding. It is often advisable to apply another ligature. Before placing the child in the water rubbing it with sweet oil or lard will facilitate the removal of the vernix caseosa. It is then placed in the bath, the head supported by one hand while the other is used to wash the infant, beginning with the head, great care being taken in cleansing the eyes. As far as possible it is advisable to avoid wetting the cord. For this reason the water is shallow. The drier the cord is kept the sooner it will separate. After the bath the child is laid on the nurse's lap in a receiver which has been warmed before the fire, and is dried by dabbing it with a soft towel and not by rubbing, which tends to excoriate the skin. After careful drying, all places where two skin surfaces are apposed are dusted with a powder containing equal parts of boric acid and starch or some similar preparation.

The eyes should be carefully wiped with pledgets of moist cotton-wool and a 1 per cent. solution of nitrate of silver dropped into each eye. A good way of putting the silver solution into the eye is as follows: The child is laid on its back and a few drops of the solution are poured into the hollow of the inner canthus: enough of the fluid will flow in if the nurse now separates the eyelids with her thumbs. Another prophylactic measure is to give a vaginal douche at the end of the first stage of labour to every patient suffering from purulent vaginitis.

When the child is thoroughly dry, the cord is dressed. There is an ever-present danger of septic infection of the cord, although it may not manifest itself in cases most carelessly treated, and yet an infant may die of infection when apparently all due precautions were taken. These precautions are only apparent, for the presence of sepsis indicates some fault in technique. With care, infection of the cord should never occur.

Various methods of dressing the cord have been advocated from time to time. Wet dressing, dry dressing, and cutting the cord off close to the abdomen have all been recommended. Occlusive dressings of gauze covered with collodion are greatly used at present. But the old-fashioned dressing of powder and a sterile dry dressing, both because of its simplicity and the good results

obtained, is the one most widely employed. If wet, the cord is carefully dried and powder sprinkled thickly both on and around it. A square of linen, or cotton wool split halfway through, is sterilised by steam or by scorching it brown before the fire. This is laid around the umbilicus and the cord is placed through the cut. A large amount of powder is placed on the pad and the edges folded over, covering in the cord. This dressing is renewed after each bath.

Clothes.—The first article of clothing is the swather. This serves to keep the dressing on the cord and to support the abdomen. It reaches from the trochanters to the lower margin of the chest. If placed higher than this, it would interfere with respiration. Amongst nurses there is a great objection to pinning the swather, and unless safety-pins are used this objection is justifiable. Stitching is usually substituted for pins, but at times this has resulted in stitching the swather to the skin. Ordinary care would prevent such an error. If the binder is made wider than necessary, turning up the lower edge after it has been put on will secure it firmly, rendering any other fastening superfluous. The vest is made large enough to cross in front and this is sufficient fastening.

The napkin particularly should not be too bulky. Bow legs may readily result from the continued outward pressure of large napkins. Pins or stitches are not necessary in fastening the napkins as the ends can easily be tucked in. The rest of the clothes, petticoat and dress, are made to fasten with tapes and are hung from the shoulders, not the waist.

The napkin should be taken off at frequent intervals during the day to enable the child to move and kick its legs freely. This stimulates the circulation and exercises the muscles. An infant depends altogether for exercise and development of its muscles on voluntary movements of its limbs, which are too often restricted by tight and cumbrous clothing. For the same reason **systematic** massage should be carried out every morning and evening, bathing time being the most convenient. The limbs are gently squeezed, and the abdomen rubbed in the direction taken by the hands of the clock, *i.e.*, in the direction of the movement of fæces through the colon.

The **prepuce** in the male child is often a source of irritation. Care in the first week will often obviate the necessity of subsequent circumcision. A small prepuce should be stretched with a sinus forceps, any adhesions between prepuce and glands broken down with a probe and the prepuce retracted. If left back after the first retraction, paraphimosis might result. Therefore the prepuce

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should be retracted twice a day when the child is bathed, being kept forward in the interval.

For the first month a child should be bathed twice a day, morning and evening. After this time sponging takes the place of the morning bath. The details for the bath are those already given, great care being taken not to wet the cord. Marine sponges ought never to be used. They are very hard to sterilise and ophthalmia has followed their use. Pledgets of cotton-wool are preferable in every way.

Breast Feeding.—Breast feeding should be insisted on as far as possible. Even though the mother decides to wean the child, it is important that she suckle it during the lying-in period. To this she will nearly always consent, if the benefit accruing both to herself and her child is explained.

The nipples should be washed with pledgets of cotton-wool soaked in normal salt solution or boric lotion before and after nursing. Maceration of the epithelium will be prevented if some alcoholic solution, such as eau-de-Cologne, is dabbed on the nipples after nursing.

It is advisable to put the infant to the breast within the first six hours after delivery. A primipara has to be taught how to nurse her child. She lies on the side from which she intends to nurse, holds the nipple between her fingers, and keeps the breast tissue well pressed back from the baby's face. If this is not done, its nose may be pressed against the breast, keeping it from breathing and greatly interfering with nursing. The first attempt at suction will not be very successful: the amount of secretion is small; the mother, if a primipara, is inexperienced, and the child's efforts are untrained and clumsy. For these reasons the first nursing need not be prolonged, but it is still of great value for three reasons. Firstly, it overcomes both mother's and child's inexperience, making each subsequent attempt easier. Secondly, it causes the uterus to contract, as evidenced by the occurrence of after-pains. Thirdly, colostrum not only trains the internal organs of digestion to their normal activities, but it also contains substances known as antigens, which excite the formation of the antibodies necessary to cause assimilation of nutriment. These antigens are missing in children artificially fed.

Fowler quotes Moro's experiments to show the importance of breast feeding during the early days of life: "If guinea pigs are separated from their mother at birth without ever having been suckled, and put beside a non-lactating animal so that they are otherwise under natural conditions, 80 per cent. die, no matter how

carefully they are fed by hand. Of animals suckled for one day 60 per cent. can be reared artificially, and of those which are suckled for two or three days 90 per cent. are reared."

Frequency of Feeding.—It is customary to feed an infant every two hours during the day for the first month. At night there is usually an interval of five hours between meals. Thus, if the last meal were at 10 p.m. the next would be 3 a.m. and the next 8 a.m. The time is always taken from the beginning and not the end of each meal. The amount given should be as much as the child will take without possetting. This rule is more scientific and satisfactory than endeavouring to determine by accurate measurements the proper amount for each meal. Infants, like adults, have different degrees of appetite, gastric capacity, and powers of assimilation. Therefore it is just as irrational to measure out a child's meal as an adult's by weight.

Recent researches go to show that an infant's stomach is not sufficiently rested, if food is given every two hours. Intervals of rest with an empty stomach are important factors in normal digestion. "One of the functions of free hydrochloric acid is to disinfect the stomach at the termination of digestion. . . . In breast-fed infants it may not be present until one or two hours after a meal, and it reaches a maximum in two and a half hours. This . . . is a strong argument for making the intervals between feeds as long as possible" (Fowler). In the Rotunda Hospital we have latterly been feeding infants at three-hourly intervals with marked benefit to both mother and child.

It is better to nurse from one breast each time. This gives sufficient time to manufacture normally rich milk. It also causes less maceration of the epithelium of the nipple than using both breasts each time. This is mentioned because it has been suggested that the latter plan is preferable, not for the child's but for the mother's sake: it is said to prevent over-distension of the breasts, enabling them to retain their normal contour and thus mitigate the deformities which follow childbirth.

General Management.—Fresh air is most important for the continued good health of the newborn child. The windows should be kept open day and night, winter and summer. During the summer the child should be left on the lawn in a perambulator, its head being kept shaded from the sun. In the hospital the windows are closed while the children are bathed, but this is more to meet the prejudices of the public than because it is necessary.

Much harm is done by the prevailing custom of overloading infants with warm and heavy coverings. These coverings interfere

with respiration and exercise, keep the child too warm, and do not give the heat centre any opportunity to adjust itself to changing temperatures. The legs are the best guide to the amount of clothing necessary. They should not be allowed to get cold, while any tendency to perspiration indicates too much warmth.

From the first an infant should be taught to sleep in a cot and not in bed with its mother. When not being fed or dressed, it should be left in the cot, which is preferably without rockers. If a child never develops the habit of being rocked, being taken into bed with its mother, or being carried about the room, it will not miss them. It is usual to heat the cot with a hot-water bottle or jar. Many accidents have occurred from leaving the bottle permanently in the cot. Children have been badly burned in this way, even though the nurse considered the jar had been sufficiently protected by flannel. If it is decided to leave the bottle in, care should be taken that there is no leaking, that the water is not too hot, that the bottle is wrapped in a flannel covering and put beneath the blanket well away from any possible contact with the child's body.

The napkins should be examined frequently and changed whenever they are soiled, either with urine or faeces. The anus, legs and buttocks should be cleaned with pledgets of moist cotton-wool, and thoroughly dried and powdered before putting on a clean napkin. Whenever a child cries between meals, it is strongly suggestive of discomfort from a soiled napkin.

Occasionally a crust composed mostly of seborrhœic secretion forms on a child's scalp. It is popularly known as "black cap," and is best removed by rubbing daily with sulphur ointment.

The cord usually falls off between the seventh and the tenth day. If there is any tendency to moisture or discharge, care in keeping it dry, well powdered, and free from infection will soon stop it. Sometimes the umbilicus protrudes, and this predisposes to hernia. A truss may readily be made from a large flat cork wrapped in flannel, and stitched into the swather before it is applied.

The liver in a newborn child occupies a considerable portion of the abdominal cavity, causing a protuberant belly. This is not to be confused with distension due to flatulence from improper feeding, or to grosser disease, such as abdominal sarcoma.

It is customary to wipe out an infant's mouth two or three times a day with pieces of linen or cotton-wool, moistened in salt solution or boric lotion. It is a question if this does not do more harm than good. It is apt to bruise the delicate epithelium, removing thereby the chief barrier to infection. At the same time there is always

the danger of introducing extraneous micro-organisms. Of course, if a white scum forms on the hard palate or elsewhere, it should be removed, as it will form a nidus for bacterial growth. With this reservation the best way to care for the mouth is to be content with gently wiping the lips, before and after nursing, with moist cotton-wool.

Infants frequently dribble freely from the mouth when a few weeks old. This is popularly attributed to "teething." It is almost universal for mothers any time after the sixth week to say that the child is about to cut its teeth. No importance is to be attached to this statement or the condition which causes it.

THE HEALTHY CHILD.

If the rules given above are carefully followed, ill-health will be rare. Full term children are naturally healthy at birth, except those affected with congenital defects or syphilis, and it requires considerable mismanagement to cause disease; so much is this a fact, that the nurse who gives as evidence of her capability that she has brought up many delicate children, lays herself open to the suspicion that her mismanagement is the cause of the disease.

A healthy infant is known by the following particulars: After the first three days it sleeps between meals, wakening at regular intervals to be fed. It sleeps almost uninterruptedly through the night, wakening once about 3 a.m. All newborn children tend to be wakeful at night. This habit is detrimental to a nursing mother's health and annoying to the family, if not promptly and firmly checked. It is advisable that an infant, even though it is fretful, should be fed only once during the night, and that about five hours after the last meal. A drink of water, warmth and a change of napkins often induces sleep. Firmness at this early date will conquer natural restlessness, and render subsequent care much easier, at the same time teaching the child order and regularity. If it is encouraged and taken up, or put in bed with its mother or nursed more frequently, the mother's life becomes a burden, and the child loses the educational value of discipline.

Each week should show an increase in weight from 3 to 10 oz., the usual average being 7 oz. This does not apply to the first week, when, as a rule, there is a drop in weight. This initial drop amounts only to a few ounces in the majority of children, but may reach a pound or a little more without indicating any abnormality. Heavy children usually show a bigger drop than those of normal weight. A small percentage of children gain in weight from the

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first, not exhibiting a primary loss. The flesh should be firm, with the pinkish hue of health, and not pale and flabby. An exceedingly heavy child is not necessarily healthy, for children bottle-fed on proprietary foods often show great accumulation of pale, flabby, unhealthy, adipose tissue.

After the first week or ten days an infant awakens about four or five o'clock in the afternoon. Even though awake and apparently observing things, it should not cry for longer than fifteen to twenty minutes.

A newborn infant's bowels should move from four to seven times in twenty-four hours. For the first three days dark green meconium comes away. This is succeeded by the normal motions of a healthy child, bright yellow, and homogeneous, with flecks of yellow or white undigested food.

Normal urine does not deeply stain the napkin. A deep stain indicates concentration, due to the ingestion of too little fluid, probably associated with loss by perspiration from too much warmth. Nurses often report after the first twenty-four hours that the child has not passed urine. If there is no swelling over the pubes indicating a distended bladder, it usually means that the urine has been allowed to dry unnoticed. Retention of urine, unless due to a tight foreskin, practically never occurs in an infant.

The anterior fontanelle in health is flush with the cranial bones. Bulging indicates intra-cranial pressure, and is said to be a forerunner of convulsions. A markedly sunken fontanelle is a serious sign of ill-health.

Parents frequently complain that the child has snuffles and has caught cold. This is not a sign of cold nor commonly a sign of specific disease. It results from careless removal of the mucus from the throat at birth. The nurse may be told to clean the nostrils with cone-shaped pieces of cotton-wool, moistened in normal salt solution.

Many infants suffer from flatulence. This is always attributable to improper feeding, usually in the direction of excess.

White coating in the mouth, red buttocks and rashes do not occur in healthy children.

Artificial Feeding.—If the mother refuses or is unable to nurse her child, it must be fed artificially. Enough has been said of the value of even a few days' breast feeding. Occasionally the mother's milk is so unsuitable that the child does not thrive until it is taken from the breast. Under these circumstances it is necessary to find a good substitute for the breast milk. As a rule, the best substitute for breast feeding will be found in *some modification of cow's*

milk. The following modification may be recommended for artificial feeding from birth until the end of the first month: Milk, $1\frac{1}{2}$ oz.; cream (15 per cent.), 1 oz.; lime-water, $\frac{1}{2}$ oz.; solution of sugar of milk, $1\frac{1}{2}$ oz.; citrate of soda, 3 gr. Of this the child should be given as much as it will take without possetting. Whatever is left should be thrown away.

Cream that is skimmed from new milk after standing six to eight hours contains about 15 per cent. of fat. Centrifugalised cream contains about 45 per cent. of fat. If the latter is used, it should be diluted accordingly.

Lime-water is made by pouring water over unslaked lime, waiting until it settles, and using the clear supernatant portion. It inhibits rennin action, the resulting curd being much more flocculent and easier to digest. In the quantity given above it has little or no antacid property.

Sodium citrate also interferes with curding from the action of rennin.

For the first three days the above mixture should be diluted with 2 or 3 parts of water, and afterwards it may be taken undiluted.

Solution of sugar of milk is made by adding 3 oz. of sugar of milk to a pint of hot water.

All cow's milk, no matter how fresh and how carefully obtained, contains large numbers of bacteria. Human milk is sterile. Therefore the attempt is always made to *sterilise or pasteurise the milk mixture before use*. The most convenient apparatus for sterilising is Soxhlet's steriliser. This consists of a large tin containing a removable rack that holds ten bottles. These bottles are specially made for the purpose. The milk mixture is put into the bottles, enough for one meal into each, and the stand placed in the tin, which should contain enough cold water to immerse the bottles above the level of the milk mixture. There is a space between the bottles and the bottom of the tin. Each bottle is fitted with a little rubber disc held in place by a loose cap. Boiling the water for ten minutes is sufficient for milk mixtures.

If undiluted milk is given, it should be sterilised by keeping the bottles in boiling water for forty minutes.

Pasteurising is much more difficult than sterilising, and its advantages are largely theoretical.

When sterilisation is complete, the bottles are removed with the rack, cooled in the air, and then put into cold water. As the bottles cool the air in them contracts, and the rubber discs are sucked down, forming an airtight cork. Any bottle not showing this depression should be used for the next feed or discarded. Enough

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bottles for twenty-four hours may be prepared at one time, kept standing in cold water and used as needed.

The cost of Soxhlet's steriliser is an objection to its use by people in poor circumstances. The milk may then be sterilised by actually boiling it, which is difficult to do without burning. A better plan is to heat it in a bottle or jug placed in a pan of water which is boiled. Allowing the water to circulate beneath as well as around the jug ensures an even temperature. The heat is maintained for the same length of time as when using a Soxhlet. The jug is then covered and kept standing in a cool place.

The milk mixture may be modified as occasion requires. If the child is not gaining in weight, the mixtures should be made stronger in fat and proteid. If it possets or passes creamy curds in the stools, the fat and proteid, one or both, should be diminished. Constipation calls for an increase in fat and sugar and a larger amount at each meal. Very often constipation is due to a lack of fluid and from the giving of too little fat. Before changing the mixture the administration of water between meals should be tried. Flatulence indicates excess of sugar.

After the first month a careful mother or nurse can best bring up an infant by Budin's method of feeding with *whole milk*. The bottles are prepared in the same way as when giving the mixture, but are kept in boiling water for forty minutes instead of ten. After the third month this period may be shortened gradually. Children properly fed on whole milk thrive, put on firm, healthy flesh, and gain in weight without becoming excessively heavy. They are quiet and do not suffer from flatulence. The stools are much larger than when the child is on the breast. The excess of casein is excreted and tends to counteract constipation. One precaution is necessary. On account of the concentration of the food only comparatively small quantities are taken and the child does not get sufficient fluid. This should be compensated for by giving water between meals. City milk, particularly in summer, is apt to contain preservatives of various kinds. Their action is most deleterious, and their presence should be suspected if a child possets in spite of apparently careful feeding.

If fresh milk is not procurable, *Swiss milk* makes a good substitute in the first three months of infancy, but the excess of sugar contained in the sweetened variety makes it unsuitable after that. Rickets is frequently seen in a six months old child that has been fed on this milk. This is attributable to too little fat and too much sugar. Cane sugar is liable to fermentation and imperfectly makes up for the lack of fat.

The great barrier to the universal adoption of the first two methods mentioned, modified milk and whole milk, is the difficulty in preparation. This has been largely avoided in large cities by the establishment of municipal milk depôts. In the British Isles Mr. Straus supplies the corporations of those cities which want it with a pasteurising plant.

When due care in preparation is not obtainable, it is obviously necessary to procure some simpler method of feeding. Amongst the poor a mixture of barley-water and milk is a well known and tolerably successful food for rearing children. Barley-water is said to have the power of mechanically interfering with firm coagulation, making the curd flocculent, and consequently easy of digestion.

Barley-water is made by adding two teaspoonfuls of washed pearl barley to a pint of water, boiling to $\frac{3}{4}$ pint and straining. It should be made fresh night and morning. Barley-water contains a certain amount of starch. Ptyalin is absent during the first few months of childhood. For this reason starch is often strongly condemned as a constituent of any infant food, although there is a little starch-splitting ferment in the pancreatic secretion of an infant. Practice does not justify this condemnation. Much harm has been done by attempting to supply in exact proportion the wants of the infant body. Meals should not be entirely assimilated either in adults or children. A residue is necessary for healthy intestinal action. The excess of casein in whole-milk feeding is passed without causing any trouble. So, too, if a milk and barley-water mixture is properly given it does not cause eructations or distension, provided that constipation does not occur. Starch readily decomposes; therefore it is imperative to keep the bowels acting freely when using barley-water.

A suitable mixture for a newborn child is 1 part milk and 3 parts barley-water, with enough dark Demerara sugar to make it palatably sweet. Sugar of milk is less liable to undergo fermentation, and, therefore, preferable to Demerara sugar. Adding boiling barley-water is sufficient to pasteurise the milk, or it may be sterilised by one of the methods already described. As the child gets older, instead of giving larger quantities, the mixture is made stronger by increasing the proportion of milk and decreasing the proportion of barley-water, until at four weeks whole milk, is being used. As the mixture gets a greater percentage of milk, more care is necessary in sterilisation.

The different *proprietary foods* require some comment. Most of the well-known brands at present on the market can be employed

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in infant feeding with moderate success. Some contain starch, others have the starch converted into dextrine, but this is probably of little practical value. The various foods are apt to produce heavy-fleshed infants, inclined to obesity and flabbiness, and such children cannot be considered normal. The one obvious advantage of proprietary foods is simplicity of preparation. Many of them are made up with boiling water, and are, therefore, unlikely to be contaminated, even when prepared by a dirty, slovenly nurse. The directions for use are on the packages. They are expensive and cannot be compared in efficiency with carefully prepared milk mixtures. In using proprietary foods it is necessary to see that they are not musty. They should not be used unless they have a pleasant biscuity flavour.

The method of administration of the food selected is of as much importance as the preparation. The old-fashioned bottles with long rubber tubes cannot be kept clean and should never be used. Bottles with mouths too small to admit a brush, those with the angles in the bottom not rounded off, those with angular instead of sloping shoulders, and those with screw caps, rubber discs and air apertures are all unsuitable. The Soxhlet bottle and the simple wide-mouthed boat-shaped bottle are the two types which have all objectionable features eliminated. They are easily cleaned and kept clean. The Soxhlet is preferable. In many of the boat-shaped bottles there is an air vent placed in the lettering on the side to hide it. The Soxhlet bottle has not an air vent. Not only is an air vent unnecessary, but it is objectionable. In breast feeding the child both sucks and chews; the former action fills the sinus in the nipple, the latter empties the milk into the mouth. Thus nursing gives the child exercise as well as food. Only sucking is necessary in bottles with an air vent, but both sucking and chewing are required with a closed bottle, therefore the latter more closely resembles natural nursing.

In artificial feeding the bottle should never be left beside the child in its cot or perambulator for it to take as it pleases. The nurse should hold the bottle bottom up to keep air out of the nipple until the meal is completed. Each meal consists of as much as the child will take without possetting, and it cannot be measured accurately according to age. As soon as the child has had enough the excess is immediately emptied, the bottle is thoroughly cleaned with cold water and placed in a solution of washing soda ($\frac{1}{2}$ oz. to a quart of water). This softens the milk scum which clings so tenaciously to glass and inhibits acid fermentation. Before using again, the bottle is thoroughly scalded with boiling water. It should

be boiled at least once a day. The nipple also requires care. It should be one that fits readily on a wide-mouthed bottle, and can be turned inside out. After use it is scrubbed inside and out with cold water and kept in the soda solution.

At least once a day the nipple should be boiled for three minutes, care being taken to immerse it and not let it float half out of the water. This care will, of course, cause the rubber to deteriorate and necessitate the use of a larger number of nipples, but rigid economy cannot be upheld against the welfare of the child. The base of the nipple is held when it is placed on the bottle. It is hard to make the laity believe that rubbing the nipple, or putting it in the nurse's mouth to try the food, is a frequent source of infection, and likely to give rise to infective enteritis. Too large an aperture in the nipple causes the child to drink too rapidly, and too small a one keeps it from getting enough food, and it may refuse to suck.

The question is often asked, **When is a child to give up bottle or breast feeding?** It should be weaned gradually from the time the first teeth appear. The reason for this is that, until used to spoon feeding, a child is likely to obtain too little nourishment. Another reason for discontinuing bottle feeding is that continued suction is said to predispose to high-arched palate, prominent lips, depression of the nasal bones, and possibly undue prominence of the alveolar ridge and front teeth.

It is best to begin weaning by giving a meal of thickened milk once a day off the spoon. At weekly intervals a spoon meal replaces a bottle meal until only one bottle is given, and that at night. This, too, soon will disappear in favour of a mug of milk.

Thickened meals are made by adding gruel made of well-ground meal boiled in milk, not water.

After weaning it is often beneficial to let a child chew on a piece of buttered crust. Such chewing exercises the teeth and jaws.

During the first year brown bread and porridge made of coarse oatmeal are not suitable, because they are difficult to swallow.

After weaning a child should be given three meals a day with two drinks of milk between meals. Variety is as important to promote the appetite of an infant as an adult.

For breakfast, porridge made of shredded wheat or some other farinaceous food is always acceptable. Honey, treacle or golden syrup may be added.

Dinner is the meal that should vary. The following is a suitable weekly menu for a child of six to nine months:

Monday.—Beef tea or chicken broth with rusks.

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Tuesday.—Mashed potato with raw egg over it.

Wednesday.—Milk pudding of rice, sago or bread.

Thursday.—Minced fish with potato, to which parsley sauce or some finely chopped green vegetable may be added.

Friday.—Potato and parsley sauce.

Saturday.—Broth and rusks again.

Sunday.—Bowl of bread and milk.

ASPHYXIA OF THE NEWBORN CHILD.

The newborn child is nearly always asphyxiated to a greater or less degree. So long as the placenta is attached to the uterine wall and the cord is pulsating normally, there is no occasion for anxiety. The child is getting oxygen from the maternal circulation. Usually the asphyxia is of such a slight degree that it passes off in a few seconds and requires nothing more than the removal of mucus from the mouth and throat, a routine measure best carried out between the birth of the head and that of the shoulders.

Sometimes there is a large quantity of mucus in the pharynx. Under these circumstances, efforts to encourage respiration by slapping the child or throwing cold water on it are apt to be harmful. The first respiratory movement is inspiration, and this often results in sucking mucus into the bronchi and lungs.

The usual division of asphyxia is into two classes, blue, or "livida," and white, or "pallida." These are the types of the two extremes, and there are, of course, gradations of all severity, from the mild degrees of blue asphyxia to the cases of white asphyxia so grave that the child cannot be resuscitated.

In blue asphyxia the features and limbs are deeply congested, the reflexes are active, the cord is pulsating strongly, but respiration is in abeyance. This disinclination to breathe seems to be a natural protection against inspiration of mucus into the lungs. It is important to clear the throat thoroughly before adopting any means to stimulate respiration. To remove the mucus, the child is held up by the feet with the head hanging down. The feet should be grasped firmly to prevent the child slipping, an accident by no means unknown and one likely to be attended with serious consequences. The little finger may be used to remove the mucus, but this can be much more easily and effectively done with a mucus catheter. In the Rotunda Hospital we use the model devised by Dr. Carton, late assistant master. It has a reservoir in the middle which prevents the operator sucking mucus into his own mouth. If properly used no harm results, and the mucus is more effectually removed than by any other method.

When the mucus is thoroughly cleared out, respiratory movements will be established. These will be hastened by slapping the back, rubbing it with whiskey, or throwing cold water on the abdomen. Such children always recover, provided that the mucus is cleared out before inspiration occurs. If the mucus is inspired, the child may pass into a state of white asphyxia.

In white asphyxia the reflexes are abolished, the child has no superficial colour, but is dead white, and at the same time is probably covered with meconium, which is always passed freely when the child is in distress. No attempt at respiration is made, and the child is limp and motionless, the cord pale and not pulsating. The only sign to show that the child is not dead is a faint pulsation of the heart. This is felt by pressing the thumb on the nipple and the index finger up under the ribs, a little to the left of the middle line. Such palpation is very sensitive, and can be entirely relied upon to determine the presence or absence of life. The heart beats in white asphyxia are very slow and feeble, requiring a little care not to miss them altogether. The pulsation in the attendant's finger may mislead him into thinking the heart is still beating. The actual heart beat, when it occurs, will never be mistaken.

If such a child is left untreated, it will be found that an occasional inspiratory effort is made, and it may recover, although no form of artificial respiration is attempted.

Occasionally the child has been put aside after delivery, supposed to be dead, when a sudden cry has awakened the attendants to the fact that life was not extinct. This rare occurrence of spontaneous recovery should not be taken to indicate that treatment is unnecessary, but showing that restoration is possible, should act as an incentive to vigorous and well-directed efforts to cause resuscitation.

Treatment consists in immediate ligature and severance of the cord, immersion in a bath at about 100° F. (comfortably warm to the elbow), removal of mucus from throat, and some form of artificial respiration.

Care should be taken not to immerse the child's mouth in the bath. Neglect of this precaution might be disastrous, for attempts at inspiration, when they occur, are most unexpected, the facial muscles not sharing in the effort as they do in blue asphyxia. While the child is in the bath, the mucus is thoroughly removed from the throat with the mucus catheter, and this manœuvre should be repeated at intervals throughout the treatment. After these details have been rapidly attended to, the child is quickly dried in a warmed towel, and some form of artificial respiration started.

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The method always adopted in the Rotunda Hospital, whenever artificial respiration is needed, is one that is frequently condemned as dangerous, namely, Schultze's method. Careful clinical observations, supplemented by post-mortem examination of those children dying, immediately or subsequently, have convinced us that Schultze's artificial respiration, properly performed, is free from danger, and is the most efficient means at our disposal to resuscitate asphyxiated children. The objections to it will be discussed after describing the method.

Schultze's Artificial Respiration.—The child is taken out of the bath and dried in a hot towel. It is essential for the operator to hold the child firmly, otherwise it may slip from both his and the nurse's hands, each one thinking the other is holding it. The best way to get a secure grip is to grasp the shoulder with the right hand, the thumb over the clavicle, the index finger in the axilla, the other fingers along the back and the palm under the occiput. The left hand is used to dry the head and upper portion of the body. The nurse holds the legs and dries the lower portion of the body. Drying the infant is an important preliminary step, as it prevents rapid lowering of the body temperature from evaporation. It also makes the infant less liable to slip from the operator's hands.

The infant is held hanging feet down, facing forwards, between the operator's legs, who grasps it as follows: The thumbs over the clavicles and the index fingers in the axillæ support the weight of the body. The two little fingers rest on the occiput to keep the neck straight and the other fingers are placed along the back. The palms of the hands support the head laterally. This is the preliminary position. Now the child is swung gently to and fro between the operator's legs, ensuring a firm grasp. This pendulum movement gets gradually longer, and finally the child is swung boldly outward and upward until the legs fall over on its abdomen. At this stage the chest is gently squeezed. This is the expiratory position and is not maintained, but immediately the child is swung back by a bold upward, outward and downward movement, the thumbs and index fingers giving sufficient hold to prevent slipping. This is the inspiratory movement, and has a powerful effect in sucking air into the lungs. The air may be heard rushing in, although the child makes no effort to inspire. At autopsy this effect is demonstrated by seeing the air vesicles distended, although the child never made an effort to inspire. The movements are performed ten or twelve times at the rate of eighteen to twenty a minute. The inspiratory position is the one in which a pause is

made. To prevent cooling the child is placed in the hot bath at frequent intervals. At these times the mucus is again removed. Efforts at resuscitation should not be abandoned until the heart stops beating and the child is dead, or until it has fully recovered and cried lustily. Whilst in the bath it is good practice to adopt some other method of getting air into the lungs. Laborde's method of rhythmical traction on the tongue is useless in a newborn child. Of much more utility and practical importance is mouth-to-mouth insufflation. By post-mortem study we have seen that this plan succeeds in forcing air into the air vesicles. A piece of gauze is placed over the child's mouth, and the operator blows through it. This is followed by pressure on the ribs at each side. The objections to mouth-to-mouth insufflation are, firstly, impure air is forced into the lungs: secondly, the stomach is also greatly distended, and by pressing on the diaphragm it may obstruct the heart action; squeezing the ribs and abdomen empties the stomach immediately, thirdly, rupture of air vesicles may occur from vigorous blowing, but the air would come from the nose first, and this acts as a safety valve. In spite of these theoretical objections, mouth-to-mouth insufflation is clinically a very useful adjunct to Schultze's method of artificial respiration.

Removal of mucus, hot bath, Schultze's method, hot bath and mouth-to-mouth insufflation, is the routine order of treatment for asphyxia adopted in the Rotunda Hospital.

Schultze's method of artificial respiration has been condemned for various reasons, but the accidents mentioned all result from improper technique, and cannot be said to result from the method itself.

(1) Cerebral hæmorrhage is either the result or the cause of the asphyxia. It is hard to understand how the hæmorrhage could result from the proper performance of Schultze's method, as the head and neck are always steadied, and remain in normal line. The fear is often expressed that a hæmorrhage present will be increased by the violence of the attempts at resuscitation, but if the child is properly swung there is absolutely no violence used. The change of position is made swiftly, but the smoothness and sureness of the trained hand are entirely free from violence. To obtain this measure of skill certainly requires more practice and dexterity than is at the disposal of every practitioner, who, until he has practised on a dummy or a dead child, will be better advised to adopt other methods of artificial respiration. Once having become proficient in Schultze's method, however, a few trials on asphyxiated children will convince any one of its superiority to other methods.

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(2) Fractures of the clavicle or the ribs. These are always the result of clumsy and ill-managed attempts at swinging. It is not always too great force that causes them, as they are as likely to result from allowing the child to flop back and forward in an endeavour to avoid violence. This is a mistake, as the quick swing of the child equalises the force, but the slow, awkward swing causes unequal, relatively powerful and abrupt changes in position and applied force. In the rapidity of the change in position, and the smoothness with which it is carried out, lies safety from these injuries. The swing should be sure and certain, not wavering and jerky. Schultze's method has been in use in the Rotunda Hospital for many years, and in the last seven years, during the term of the ex-master, neither clinically nor at autopsy have any of these injuries been observed.

(3) Shock from rapid cooling of the body. This is overcome by frequent immersion in a hot bath, and drying the child quickly but thoroughly before re-starting artificial respiration.

(4) Allowing the child to slip or to strike any object in the room is obviously due to carelessness. A firm grasp properly applied will secure the child against such a disaster.

The practitioner, who is not perfectly sure of his ability to perform Schultze's method properly, had better be contented with some other method of artificial respiration as an addition to the bath and mouth-to-mouth insufflation. One of the best of these is Marshall Hall's method. This is performed as follows: Having been thoroughly dried the infant is laid on its back across the operator's lap, with the inner arm extended above its head. This is the inspiratory position. It is then rolled over on its face, away from the operator, the arm is brought down, and the chest gently squeezed. This is the expiratory position and is not maintained, but the child is immediately rolled on to its back, the arm being extended at the same time.

Sylvester's method, elevation of the arms followed by depression with pressure on the chest, is of very little use in a newborn child, as the muscles are not well enough developed to have much effect on the chest wall. It is said to act more effectively if the legs are fixed by an assistant.

Byrd's method, alternate flexion and extension of the child's body with a hand under the head and shoulders, and one under the breech, has nothing to recommend it over Marshall Hall's method. Spinal injuries are reported from its use. These must have resulted from the exhibition of too much force.

One point of importance in performing any method of artificial

respiration is worth emphasising, that is, the frequency of the movement. The usual text-books advise six to ten movements a minute, but much better results follow if this is increased to eighteen to twenty, or even more. This more nearly approaches the normal rate of infant respiration, and at the same time acts better as a stimulant to heart action.

Cold douches and cold baths should never be employed in an attempt to resuscitate a child in white asphyxia. In this condition the reflexes are abolished, so that, even from a theoretical standpoint, cold can have no effect on the respiratory centre, but it increases the profound shock resulting from asphyxia, and may readily cause the child's death. As the child recovers and passes into the stage of blue asphyxia a rapid dip into cold water will often serve to make it cry, but this should never be used until the child has made several inspiratory efforts, and the colour has returned to the body surface.

Recently, direct heart massage has been suggested as a treatment for asphyxia. This may be imperfectly carried out by rhythmic pressure and relaxation with the index finger and thumb in the position for palpating the heart. To massage the heart properly, a small incision should be made into the upper abdomen and a gloved finger pressed directly on the diaphragm and the overlying heart. The claim made that this resuscitates asphyxiated children can readily be understood, and it is practically certain that the heart massage performed in Schultze's method is largely responsible for its success.

Oxygen is often recommended for asphyxia, and if it could be forced in would be better than mouth-to-mouth insufflation. Direct infusion of normal saline infusion through the umbilical vein is another well recognised treatment that has resulted in rapid resuscitation. Unless asphyxia were expected, it is unlikely that facilities to employ this method would be available, and valuable time would be lost while preparing for it. Certainty of asepsis is essential. If available, this method will prove beneficial in most cases of white asphyxia.

When leaving a child that has had to be resuscitated, the doctor should give the nurse directions to watch carefully its progress. Secondary asphyxia is not uncommon, but can largely be avoided by warmth and stimulation. If it does occur, the nurse should repeat the warm bath and Marshall Hall's method of artificial respiration.

CONGENITAL DEFECTS.

Routine examination of the child shortly after birth will discover the presence of any visible or palpable malformation. For instance,

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inspection of the head will show hydrocephalus; of the abdomen, umbilical hernia; of the extremities, deformities of the hands, feet, etc. Palpation may be necessary to determine other defects, such as imperforate anus, non-descent of the testicle, etc.

Hydrocephalus.—There are two main classes of hydrocephalus, external and internal. External hydrocephalus, the accumulation of fluid between the dura mater and the cortex, is, in children, practically always due to meningitis or rickets.

Internal hydrocephalus is the result of the accumulation in, and distension of, the lateral ventricles with cerebro-spinal fluid, or when due to inflammation, serous exudate. The former is the congenital type. The amount of fluid varies greatly. In extreme cases the accumulation is enormous, and the brain substance is thinned to a capsule a fraction of an inch in thickness. Over this the skull is so stretched that the attenuated bones form only a small portion of the cranium, the sutures and fontanelles being very large. Wormian bones may develop in the sutures. Fortunately these hydrocephalic monsters seldom survive. They are usually born dead, often having been perforated to render delivery possible. Those born alive live only a few hours at most.

Lesser degrees of hydrocephalus are not incompatible with life and many victims of the condition survive, usually to become imbecile inmates of an asylum, although some display surprising mental capabilities. Therefore minor degrees of hydrocephalus do not certainly indicate mental deficiency.

The obstetrician is frequently consulted as to the treatment of a hydrocephalic infant. There is some reason to believe that improvement may follow persistent and prolonged treatment in minor cases. Of drugs, grey powder in small and continued doses is the one most often advised. Strapping the head firmly with soap plaster or Scott's mercurial plaster is a remedy of doubtful value which should, however, be given a trial. Broad strips of plaster are applied so as to cross on the vertex, followed by a circular strip around the forehead and base of the skull. Pressure may be used alone or in association with drawing off some of the fluid. Several methods for the withdrawal of the cerebro-spinal fluid have been suggested.

Temporary improvement nearly always follows aspiration, either by direct or by lumbar puncture. Direct puncture may be made through the supra-orbital plate, behind the ear, or through the anterior fontanelle. The lateral ventricle is easily reached when it is distended. Kocher gives the following description:

"We have, as a rule, made the puncture in a direction downwards

and backwards, somewhat in front of the bregma 2 centimètres ($\frac{1}{2}$ inch) from the middle line. The needle must penetrate from a depth of 5 centimètres (2 inches) before it reaches the ventricle, which it will certainly enter if it is distended with fluid." ¹

Relief from simple puncture is, as a rule, temporary, and convulsions have followed too free and rapid withdrawal of fluid. The advice usually given is to draw off a comparatively small quantity at a time, just sufficient to relieve the great tension.

The most recently introduced operation for hydrocephalus has not fulfilled all that was expected of it. It consists in draining the lateral ventricles into the sub-dural space by means of strands of catgut introduced after trephining or puncture. These operations have occasionally produced most satisfactory temporary results. They frequently end fatally, and, if not, are nearly always followed by recurrence, due to the difficulty of keeping the drainage channel open. Permanent drainage by a tube would lead to death from loss of body fluid.

Anencephalus.—This monstrosity is of interest only from a pathological and embryological standpoint. An anencephalic fetus is either born dead or dies shortly after birth. There is no treatment for the condition. It is said to be a later stage of hydrocephalus, and is often an accompaniment of hydramnios.

Meningocele, Encephalocele and Hydrencephalocele.—Protrusion of the brain membranes alone constitutes meningocele. If the sac contains brain tissue it is an encephalocele, and if this brain tissue contains a portion of a ventricle it is a hydrencephalocele. All three present similar characteristics. They are situated over a suture or fontanelle, usually in the occipital region. The defect through which the tumour is protruding can often be outlined, and crying or straining causes increased tension. In addition, encephalocele pulsates synchronously with the heart.

Treatment offers little prospect of relief or cure. Keeping the skin clean and dry and protecting it from injury is all that can be done in most cases. Reduction, even if possible, produces signs of brain pressure. Finally, operative measures consisting of puncture, reduction and pressure, or of excision of the sac have all been tried, but with little success. Meningocele is the easiest to excise. In the other forms it may be necessary to remove part of the brain tissue before being able to close the sac. These operations have not shown promising results. If the sac bursts, the child soon dies of infection and continuous loss of fluid.

Harelip and Cleft Palate.—The lip may show a single or double fissure. This condition is frequently associated with cleft

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palate and at times is complicated by protrusion of the alveolar arch.

Operation for harelip should be undertaken early in life, good results following operation during the first week.

The best time for operating to cure a cleft palate is still uncertain, but it should not be deferred longer than twelve months. Unless the fissure in the bone is closed early and successfully the child's voice will have a persistent disagreeable nasal tone. If the soft palate alone is fissured, treatment is much easier and simpler.

Cystic Hygroma.—This is a cystic lymphangioma present at or soon after birth, growing from beneath the deep fascia, most frequently situated on the side of the neck in front of or behind the sterno-mastoid.

Hygromata may undergo spontaneous cure, usually as a result of inflammation. If suppuration supervenes, the sac must be incised and drained.

Operative treatment consists in the injection of iodine as for hydrocele, or incision and drainage, or complete excision. The latter is the most difficult and dangerous treatment, and should only be undertaken by a skilful surgeon.

Tongue Tie.—This condition most frequently exists in the imagination of the mother. No treatment is necessary unless suckling is interfered with.

Treatment consists in cutting the frenum near the base of the mouth with a pair of blunt-pointed scissors. Although a simple operation it may be followed by severe hæmorrhage, and if the scissors are not sterile the surface may become infected. The bleeding is readily stopped by pressure with cotton-wool. The physician should not leave until all bleeding has stopped.

Hernia.—Although spoken of as congenital, umbilical and inguinal herniæ rarely show themselves before the third or fourth week after birth. As a rule, symptoms of indigestion and periods of crying or violent straining precede the appearance of a hernia. After one of these attacks the hernia makes its appearance quite suddenly. Phimosi predisposes to all forms of hernia.

Umbilical Hernia.—The child's mother is usually greatly perturbed over the appearance of an umbilical hernia, but it seldom persists, as is evidenced by the fact that comparatively few are seen after the second year, although they are very common in earlier life. Under these circumstances, operative interference seems uncalled for. Reduction of the hernia and keeping it in place is all the treatment that is ordinarily required.

A well-fitting truss obtained from a surgical instrument maker

will always keep a hernia reduced. A simpler, cheaper and equally efficient means is to sew a flat cork or a large coin into the child's binder. This is better than strapping with adhesive plaster. In addition to the local treatment digestive disturbances should be corrected, the bowels kept open, and a tight prepuce stretched or cut.

Occasionally a child is born with enormous hernial defects. It may have its liver, stomach, spleen and intestines protruding from the abdomen, and contained in a sac of Whartonian jelly. In lesser degrees the intestines alone may be contained in the sac.

If no interference is undertaken, the sac will rupture in a few hours, and under such circumstances reduction is extremely difficult. A hernia of this kind should be operated upon as soon as possible after birth, before rupture of the sac. Often the intestines are so adherent to the sac that attempts to strip them may cause rupture of the bowel. It is best, therefore, to leave the adherent parts of the Wharton's jelly and return them to the abdomen with the contents of the hernia. These operations are frequently successful, but at other times the abdomen is not large enough to contain the extruded viscera.

The operation consists of freshening the edges of the hernia, reducing its contents and uniting the abdominal walls with through-and-through sutures of silk or silkworm-gut. To facilitate closure and reduction in a difficult case it is a good plan to put in interrupted sutures one by one, at the same time gradually returning the viscera.

With each stitch more and more is replaced until finally the abdominal wall will cover the defect, although sometimes the tension is very great. The subsequent treatment is to keep the wound surface clean and dry with aseptic dressings and to feed the baby as if it were normal in every way.

Inguinal Hernia.—What is true of umbilical hernia is true of inguinal hernia, as regards time of appearance, causation, treatment and ultimate cure. It may be unilateral or bilateral. A large number will be cured spontaneously and permanently if the hernia is reduced and kept back by a truss, or by pressure with a pad and a spica bandage of the groin. At the same time circumcision should be performed if it is indicated, and any digestive disturbances corrected.

Strangulated Hernia.—This is a very rare accident in newborn children. When it does occur, it is recognised by a reducible hernia becoming irreducible, probably larger than before, associated with vomiting and pain, the latter evidenced by loud and prolonged screaming. If untreated, the vomiting becomes faecal in character,

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and the child dies with all the symptoms of acute intestinal obstruction.

Treatment consists in immediate operation, in which relief of the strangulation should be followed by radical cure of the hernia.

Hydrocele.—Hydrocele is a condition often confused with inguinal hernia, a mistake apt to occur because hernia in a young child may be translucent, and hydrocele may give an impulse on coughing. Sometimes a hydrocele can be reduced. Dulness on percussion, the size and shape of the tumour, and the method of its return to the abdomen, if reducible, make the diagnosis. Hydrocele of the cord appears as an encysted elastic tumour, dull on percussion, occupying the inguinal canal. It is not reducible, but may exhibit an impulse on coughing.

Congenital hydrocele tends to disappear spontaneously. If it does not, simple tapping may be sufficient to effect a cure. If this fails, excision of the sac should be undertaken. The injection of iodine or carbolic acid to obliterate the sac by resulting inflammation is no longer justifiable.

Non-descent of the Testicle.—When the testicle is not in the scrotum its most frequent position is in the inguinal canal, where it may be mistaken for a hernia or hydrocele of the cord. Its absence from the scrotum and its shape should make the diagnosis. The testicle may be arrested anywhere along the track of its descent or it may be misplaced into some position around the pelvic outlet. These abnormal positions are often associated with hernia.

As descent of the testicle into the scrotum seems to be necessary for proper masculine development, the recognition of any abnormality early in life is important. Manipulations may succeed in lengthening the cord, and causing it to enter the scrotum. If these fail, an operation late in life may be indicated. If it is impossible to bring down the testicle, it should be returned to the abdomen, where it will have a better chance of developing.

Extrophy of the Bladder.—This distressing abnormality is readily recognised when it occurs. It is often associated with a split pelvis. The bladder protrudes through the central line above the pubes, its red, velvety-looking mucous membrane being constantly wet with urine. The ureteral orifices are often hard to find, because of the swelling of the mucous membrane.

The distressing condition resulting from extrophy of the bladder makes life a burden to the patient and to those who come in contact with him. For this reason an operation, however dangerous, becomes imperative (*see Diseases of Bladder, Vol. II.*).

Phimosis.—Proper care of the prepuce from birth counteracts

any tendency to phimosis. If for any reason this care is not taken, or circumcision is requested by the family, it should be done early, as then hæmorrhage is very slight and sutures are not necessary. After the second week three or four sutures of catgut should be used to join the skin and mucous membrane. If the ends of the sutures are left long after knotting they can be tied down again over a piece of gauze around the incision. This makes a very effective and neatly fitting dressing.

Spina Bifida.—The usual case of spina bifida offers little or no chance for surgical interference. When the sac is formed only by a thin bluish transparent wall, with the healthy skin stopping at the edge and probably adherent, the only treatment possible is to keep the parts clean, dry and protected from injury. Sooner or later these children die from ulceration of the sac and meningitis, or loss of cerebro-spinal fluid.

Occasionally a spina bifida is partially or wholly covered with healthy skin. Under such circumstances the sac should be opened, any nervous tissue it contains returned to the spinal canal, and the healthy skin surfaces brought together with interrupted sutures. If the tension is not too great, these operations are primarily successful, although hydrocephalus may develop subsequently. Care is necessary to avoid wounding nerves, as they are frequently adherent to the sac wall. Failure of union leaves the child as it was before operation, to die of infection or loss of fluid.

Atelectasis.—True collapse of the lung after it has once been expanded probably never occurs. As seen in the newborn atelectasis is always due to primary non-expansion of the lungs. It is seen most often in weakly, premature children, and may be suspected if a child that has never cried properly has feeble, shallow respirations and attacks of cyanosis. Treatment should be directed to causing deeper respirations, making the child cry frequently, if possible. Atelectasis is a common cause of sudden death. A child with this condition requires warmth and careful watching. A hot bath and artificial respiration (mouth-to-mouth) may tide it over attacks of cyanosis.

Absence of Half the Diaphragm with Dextrocardia.—This is not an uncommon condition, and usually results in sudden death thirty minutes to an hour or two after delivery. It may be suspected if an apparently healthy child becomes asphyxiated after birth. If the left half is missing, the heart is on the right side, the lungs are rudimentary, and the intestines occupy the left chest. Treatment is unavailing. We have seen two of these cases within the last year.

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Congenital Cystic Kidneys and other Abdominal Tumours.—These are only of interest in that they may cause puzzling obstruction to labour.

Imperforate Anus.—As children with imperforate anus will certainly die if untreated, operation should be undertaken as soon as the condition is recognised. If external examination does not reveal it, it should be suspected if a child does not pass meconium for twenty-four hours after delivery. Passing the little finger or a thermometer through the anus will demonstrate any obstruction.

When the obstruction is at or near the anus, incision into the bowel is easy. After incision the edges of the mucous membrane of the rectum are brought down and sutured to the edges of the skin wound with interrupted catgut sutures.

If the obstruction is far up, it may be felt by passing the little finger through the anus. The site of obstruction usually bulges downwards from the pressure of the intestinal contents. Incision, should be undertaken as soon as the diagnosis is made. Primary and secondary hæmorrhages are the chief dangers of these operations. When they occur they are often fatal.

When the lower part of the rectum and anal canal are absent, they may be reached by dissecting up close along the anterior surface of the sacrum. If this fails, an artificial anus may be made above Poupart's ligament.

To prevent stricture after operation it may be necessary to pass a dilator once or twice a week for some months.

Hypospadias.—No treatment is indicated until the child gets old enough to make operation easy, from the sixth to the twelfth year.

Hermaphroditism.—Treatment is seldom possible. It is always surgical, and should be deferred until after the sixth year.

Talipes.—A great deal of benefit always results from early, vigorous and persistent treatment of the various forms of club-foot. Massage and passive movements to correct and over-correct the deformity should be carried out for five or ten minutes three to six times a day. It is surprising how little deformity persists after a year of such treatment. Pads and splints are contra-indicated. They cause atrophy of the muscles and ulceration of the soft parts, no matter how carefully they are applied.

Every child with skeletal deformities of any kind should be seen as soon as possible by an orthopædic surgeon. Under intelligent treatment surprisingly good results are obtained in nearly all forms of congenital deformities of the feet.

Union of Digits.—Operation to correct this condition should be

deferred for some years, as it requires careful flap formation to prevent contraction of the cicatrix and disabling deformity. The third and fourth fingers or toes are the ones usually united.

Supernumerary Digits.—When improperly placed or rudimentary, these should be amputated. If of normal size, shape and position, no treatment is indicated.

Nævus.—Nævi are a source of great worry to the parents and when large constitute grave deformities. Sometimes they extend over three-quarters of the body surface. Under these circumstances they are outside the pale of surgery. When small enough, removal by the knife is by far the most satisfactory method. It can be done in a bloodless manner by pressing a key ring around the circumference of the nævus while excising. Deep parallel sutures of silkworm-gut passed through bone buttons, placed on either side of the wound, will bring together the deep parts and prevent hæmorrhage. A subcutaneous silkworm-gut suture will bring the skin surfaces into close apposition, ensuring the minimum amount of subsequent stretching of the cicatrix.

Nævi of larger size can be treated by electrolysis, by caustics, such as hydrofluoric acid, by X-rays, or by the most recently introduced method, carbonic acid snow. This snow is formed by a spray of compressed gas escaping into a chamois bag. The snow thus formed is collected in a spoon and forced into a cylinder, which is placed over the nævus. The snow is pressed on to the nævus, and is left there for twenty to forty seconds. Some pain often follows its use. More powerful effects can be obtained by using liquid air, and it is particularly indicated in angiomatous nævi. Its use is not without danger, and at first the period of application should not exceed ten seconds. Vaccination is another method suggested for removing nævi.

It is important to remember that nævi increase with the growth of the child, so that the earlier the removal the less will be the deformity.

BIRTH INJURIES.

Cephalhæmatoma.—While cephalhæmatoma may form during or immediately after labour, it is usually not recognised until the second or third day, as at first it is mistaken for the caput succedaneum. It manifests itself as a cystic swelling beneath the pericranium. Examination shows that it does not lie over a suture but is limited by the edge of the bone on which it is formed, being of course defined by the attachment of the pericranium. Cephalhæmatoma forms most frequently on one or other parietal bone,

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occasionally on both. After a day or two the border of the tumour is formed by an elevated ridge of exudate which gives a puzzling suggestion of bone deficiency, and this is intensified by the fact that the underlying bone often cannot be felt, making it necessary to distinguish cephalhæmatoma from encephalocele and meningocele. This is easily done owing to the situation of the tumour and the fact that encephalocele and meningocele become tense when the child cries or strains.

There is seldom or never any indication for active treatment in these cases. The usual experience is that the hæmorrhages disappear spontaneously in a longer or shorter time, leaving no deformity. Absorption may be hastened by using cold compresses and pressure. If suppuration occurs, the diagnosis is easy and the treatment is incision. If a cephalhæmatoma grows progressively larger, it may give rise to the fear of the destruction of the pericranium from pressure. Under such circumstances aspiration would be indicated. As a matter of fact these complications are very infrequent.

Fracture of the Skull.—Infants are occasionally born with deep indentations of the skull, either spoon-shaped or angular. The spoon-shaped fracture has a tendency to spontaneous cure, but this should never be waited for, as impaired mental development may follow prolonged pressure. It has been suggested² that the head should be squeezed between the knees in the antero-posterior diameter. Many operators have found this a most successful method, but it often fails. When it does, the depressed bone can be readily drawn into place by the following method, introduced seven years ago by Dr. Hastings Tweedy: "The sharp point of one blade of a bullet forceps is bored through the bone at the centre of the fracture. The point must be sharp, otherwise the depression is increased. The shank is then turned at right angles to the bone and the depressed fracture pulled steadily into position."

Subsequent treatment consists in applying a simple sterile dressing for a day or two. Hæmorrhage or injury to the brain does not occur, and the bone is always easily raised. An autopsy on a child dying of an intercurrent attack of infective enteritis proved this.

This method was successfully used to raise a depressed fracture which had persisted for fifteen months after birth (*see also* Head Injuries, Vol. I.).

Cerebral Hæmorrhage.—Forceps delivery must be classed as one, if not the most frequent, cause of this condition. It may also occur

after difficult breech delivery and after normal labour, particularly in children born in a condition of marked blue asphyxia. Congenital diseases, such as syphilis, are likely predisposing causes.

If the hæmorrhage occurs into the base of the skull during labour, the child may be born dead, or, although born with the heart beating, become asphyxiated and die without attempting to inspire, pressure having paralysed the respiratory centre.

If the child survives, it frequently shows some paralysis of the arm or leg, twitching of the affected side (popularly called "internal convulsions") and cyanosis with feeble shallow respiration. Death frequently follows this condition. In fact, it is one of the commonest causes of infantile mortality before the third day.

If localisation is possible, trephining with evacuation of the clot should be undertaken. Needless to say, the prognosis in such an operation is very uncertain. Other treatment is symptomatic.

Hæmatoma of the Sterno-mastoid Muscle.—This condition may follow difficult breech delivery and may by pressure on the brachial plexus cause paralysis of the arm. It is also said to cause torticollis.

Spontaneous improvement results as the blood is absorbed. Possibly evaporating lotions may hasten absorption. Incision is rarely indicated.

Facial Palsy.—This is nearly always the result of pressure on the facial nerve with the blade of the forceps. Spontaneous cure within a few days is the almost invariable result.

Brachial Palsy.—Of much more serious significance is paralysis of the arm resulting from stretching of the brachial plexus during forcible extraction of the after-coming head.

This injury is recognised by the flaccid condition of the arm, which is shown not to be dependent on fracture or dislocation.

Massage, fomentations, evaporating lotions and time will bring about gradual recovery in most cases.

If one or more cords of the plexus are severed, the paralysis will be permanent unless operative measures will effect a cure. These operations, suture of the divided nerves, are troublesome and uncertain and require great surgical skill for their successful performance. About the second year is the usual time of operation, although some surgeons prefer to operate earlier.

Fractures of the Long Bones.—These are usually of the greenstick variety, and most frequently occur in the clavicle or humerus, as a complication of breech delivery.

Humerus.—Protecting the apposed skin surfaces with powder and cotton-wool, bandaging the humerus to the side and the forearm

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across the front of the chest, will result in good union, which will be complete in ten days.

Clavicle.—The same treatment may be used for a fractured clavicle, but as a rule no treatment is necessary. Fracture of the clavicle is easily overlooked, if the shoulder is not carefully examined.

Femur.—Bandaging the fully flexed thigh and extended leg along the body for ten or twelve days will be followed by good union.

Dislocations.—For congenital dislocations, which are usually of the hip or shoulder, no treatment is applicable during the early period of infancy.

Epiphyseal Separation.—These accidents result from injury at birth or rough handling of an infant. They should not be mistaken for congenital dislocations and left unreduced. They are to be treated like fractures. If there is any difficulty, a skiagram will establish the diagnosis.

Rupture of the Cord.—The cord is occasionally torn during delivery. If untreated, this almost always leads to hæmorrhage, which, however, may not appear for some time after delivery.

Departure from the ordinary method of ligature is only necessary when the cord is snapped off close to the abdominal wall. Should this occur, it will be necessary to underpin the umbilicus. This is done by passing two needles transversely through the skin and beneath the torn surface of the cord. Around the needles is wound an aseptic silk ligature or a piece of woollen thread sterilised by boiling.

DISEASES OF THE NEWBORN CHILD.

Ophthalmia Neonatorum.—*Prophylaxis.*—This has already been described (*see* p. 338).

When possible, every case of acute conjunctivitis should be treated by an ophthalmologist. The number of patients with corneal opacities, perforations and blindness would thus be minimised. If the general practitioner has to treat the condition, the following measures will usually arrest the progress of the disease. If taken in time and treated persistently, the prognosis is good as a rule.

Treatment.—If the infection manifests itself in one eye only, an attempt should be made to prevent extension to the other eye. For this purpose the child is laid on its side across the nurse's knee, infected eye downwards. The sound eye is now carefully washed from the outer to the inner canthus with pledgets of cotton-wool soaked in boric lotion. Then a couple of drops of a 1 per cent. solution of silver nitrate are dropped into the eye, after which it is

covered with pledgets of cotton-wool soaked in boric lotion, and this dressing is kept in place with strips of plaster.

Attention is next turned to the diseased eye. It is cleaned with cotton-wool and boric lotion, each pledget being used only once and the eye being wiped from the inner to the outer canthus to avoid carrying infection towards the sound eye.

The lids, having been cleaned, should be separated to give access to the conjunctiva. This is often difficult on account of the swelling of the lids, and there is a danger of pus squirting out suddenly when they are opened.

Whoever dresses the eye should be warned of this. After the conjunctiva has been thoroughly irrigated with boric lotion, a few drops of a 2 per cent. silver solution are instilled into the eye. The bathing should be done every hour during the day and every two hours at night. The silver solution is used twice a day during the height of the disease and once a day thereafter. Cold wet compresses may be indicated during the acute stages of the infection to allay pain.

Treatment of complications should be relegated to the specialist.

Everyone coming in contact with a child suffering from acute purulent conjunctivitis should be informed of the extremely infectious nature of the discharge. Anything that has come in contact with the pus should be burned or boiled, and the attendant's hands should be carefully scrubbed after treating the eyes.

Infective Enteritis.—The most common affection of newborn children and the most frequent cause of death is the disease which manifests itself by causing green diarrhoea. This disease is caused by micro-organisms which have been swallowed in improper food, from a dirty "comforter" or fingers, from a cracked nipple, etc. The diarrhoea is frequently accompanied by "thrush" (aphthous stomatitis) which is characterised by the formation of small white patches on the oral mucous membrane. These patches are due to the growth of some form of mould which flourishes in a milk medium. This condition adds fresh danger to that induced by the intestinal infection. Red buttocks always result from an attack of green diarrhoea and may run on to ulceration.

Most bottle-fed children develop more or less mild attacks of this infection, and the malignant, rapidly fatal forms are practically never seen in breast-fed children.

Treatment should be directed primarily to the evacuation of the intestinal toxins. To this end the administration of castor-oil is indicated once or twice a day throughout the entire attack. To combat the gastritis, the stomach may be washed out with normal saline solution through a No. 10 rubber catheter, an easy, safe and

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efficient method of stopping vomiting; frequent enemata to cleanse the lower bowel are also useful adjuncts in eliminating toxins; 1 to 1½ oz. of fluid may be introduced into the rectum of a child under a month old.

Of the greatest importance is regulation of the diet. Milk in any form tends to prolong the condition. Difficulties arise in procuring a suitable substitute. Raw beef-juice and barley-water, sweetened with sugar of milk, supply the food requirements with the exception of fat. Ten drops of cod-liver oil three times a day, or egg spoonfuls of pancreatic emulsion, or preparations such as virol will supply this want.

Infants can be tolerably well nourished for a week or a fortnight on Mellin's food, or some similar proprietary food prepared with albumen water, to which may be added a small quantity of pancreatic emulsion. Albumen water is made by adding the white of one egg to half a pint of cold water and straining through clean muslin. It may be used in full or half strength. With such diet the child usually succeeds in overcoming the infection.

Of drugs employed the following are amongst the most popular: Calomel, ¼ gr. twice daily; grey powder, ½ to 1 gr. twice daily; salicylate of bismuth, 2 to 4 gr. twice daily; petroleum emulsion in 20 min. doses, to which may be added ½ min. doses of carbolic acid together with some one of the many pepsine preparations.

Lactic acid in three to five drop doses is a much favoured remedy. Probably better effects will follow the administration of soured milk (Bulgarian), given once or twice daily to the child. The buttocks should be treated with oxide of zinc ointment or painted with a saturated solution of picric acid in methylated spirit.

Finally, a child suffering from vomiting and diarrhoea has its system drained of fluid, and it is therefore necessary to compensate for this loss by giving water by mouth and bowel.

Constipation.—Bottle-fed children are frequently constipated and breast feeding does not always ensure against this. The ingestion of too little fluid is one of its most frequent causes. Constipation is more apt to arise from over- than from under-feeding. The former causes gastritis and possetting, with constant loss of the fluid contents of the stomach and subsequent thirst. This thirst occasions fretfulness on the part of the infant and the mother always interpreting this fretfulness as a sign of hunger overloads the stomach with a fresh meal. Thus a vicious circle is established and a child may be found dying of thirst, although constantly swallowing nourishing fluids. A less frequent cause of constipation is a paucity of fat in the diet.

Careful regulation of the times of feeding is most important. The intervals should be lengthened and the time of feeding adjusted to definite hours. It is essential to administer plenty of plain water between meals. Gentle massage of the abdomen is a very useful measure to promote peristalsis. A soap suppository at regular intervals may stimulate the rectum to rhythmical peristalsis. Finally, drugs may be necessary as a temporary means of treatment.

It is well to begin treatment by giving a full dose of castor oil. Castor oil tends to promote secondary constipation, but this will be overcome by some mild laxative such as drachm doses of Frommer's extract of malt and cascara sagrada, grey powder, milk of magnesia, syrup of senna or syrup of figs.

Congenital Syphilis.—The administration of mercury constitutes practically the whole treatment of congenital syphilis. There is some reasonable doubt as to which is the best preparation of mercury to use, but grey powder is probably the most popular. In $\frac{1}{2}$ to 1 gr. doses twice a day it will as a rule cause rapid disappearance of all syphilitic lesions. Mercurialism in a child manifests itself by diarrhoea and not by salivation. If a child cannot take grey powder without getting diarrhoea, daily inunctions of mercury ointment in 15 gr. doses should be substituted. Calomel is another preparation of mercury that may be used instead of those already mentioned. It is given in $\frac{1}{2}$ gr. doses twice or three times a day.

In hospital and dispensary practice the question of the length of time treatment should last is usually settled by the cessation of the child's visits as soon as it is symptomatically cured. If possible, it is best to continue treatment for eight to twelve months. Children taking a long course of mercurial treatment are apt to become anæmic. When this occurs, the administration of iron and cod-liver oil is indicated.

Local lesions, snuffles, ulcerations, etc., require local applications, as in acquired syphilis.

Jaundice.—When jaundice is due to congenital or acquired obliteration of the bile ducts, treatment is unavailing. The child always dies. Jaundice as a symptom of congenital syphilitic hepatitis is treated with mercury, but this is usually without effect on the fatal issue. Syphilitic jaundice has a bad prognosis. The treatment of jaundice resulting from infection of the umbilicus is that of the infection.

Fortunately these forms of jaundice are rare, and the form commonly seen is catarrhal in origin and spontaneous recovery is the rule. Three to five grains of sodium phosphate may be

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given two or three times a day, if treatment is considered necessary. A dose of castor oil often helps to clear up a slight attack of jaundice.

Sepsis of the Cord.—This is best avoided by cleanliness in dressing the cord. Any one of the various recognised methods of treating the cord, if properly carried out, will prevent sepsis.

When it does occur, sepsis of the cord may manifest itself by a local inflammation, or jaundice, or general septicæmia. Treatment in the latter two forms offers little or no hope of stopping the progress of the disease. It should consist in local treatment of the cord to prevent extension and reinfection, and in addition general symptomatic and supporting treatment.

Local infection of the umbilicus is treated with hot fomentations (boric lotion or sublimate solution) or poultices, and free incisions when suppuration occurs.

Secondary Hæmorrhage of the Cord.—This sometimes occurs because the ligature has been too loosely applied. Tightening the knot or applying another ligature will stop the hæmorrhage.

Hæmorrhage from the umbilicus after the cord has fallen off, or when it has partially separated, is due either to sepsis or hæmophilia.

If very little, a drop or two of adrenalin or a dusting powder containing tannic acid may stop it. If not, it will be necessary to underpin the umbilicus.

Angioma of the Umbilicus.—A small polypoid growth occasionally appears on the umbilicus at the root of the cord. An aseptic or antiseptic silk ligature applied to the pedicle followed by excision of the growth is the best treatment.

Melæna.—Blood swallowed at the time of delivery or from a cracked nipple may be passed in the stool, although it is usually vomited. True melæna is most often due to hæmophilia, and treatment is very uncertain. Feeding may cause the hæmorrhage to continue, and starvation combines with the loss of blood to cause great constitutional depression. Food should be stopped for a short time, twelve or twenty-four hours, to see if this has any effect on the bleeding. Various styptic drugs are recommended, and may be tried. One useful prescription consists of one drop of adrenalin and 3 to 5 gr. of calcium lactate given three times a day. This sometimes seems to arrest the hæmorrhage.

Marasmus.—When due to improper feeding, congenital syphilis or tuberculosis, the treatment is that of the cause. If the cause of the wasting is *congenital pyloric stenosis*, washing out the stomach, feeding by a tube, with human milk if possible, and

regulating the interval and quantity to suit the individual case, if employed persistently, will cure many cases. Drugs have no place in the treatment of this condition.

Scurvy.—Attention to diet and giving a certain amount of fruit juice or meat juice will result in cure. Proprietary foods should be given up in favour of milk, taken unboiled, which enables it to retain its antiscorbutic properties.

Rickets.—Attention to diet and hygiene will prevent the occurrence of rickets. Correction of unsuitable diet with improvement of hygienic conditions will arrest the progress of the disease once it has started, but will not cure the deformities already present (*see* Vol. I.).

Strophulus.—Popularly known as “gum,” this is a common eruption seen in newborn children. It is due to indigestion, and should not be mistaken for congenital syphilis. Keeping the child cool and dry and applying a dusting powder is all the local treatment necessary. Digestive disturbances should be corrected.

Mastitis.—Newborn children, both male and female, frequently secrete a milky fluid. This is inflammatory in origin and requires no treatment other than a pad and a fairly firm bandage, which should not be tight enough to embarrass respiration. Massage only serves to irritate the breast, and may give rise to infection with consequent suppuration. If this does arise, it is treated with hot fomentations and incision.

Vaginal Hæmorrhage.—Infants occasionally bleed from the vagina. This has no serious significance unless it is due to hæmophilia. There is no treatment.

Intussusception.—No palliative treatment is to be considered when the diagnosis of this condition is established. Immediate abdominal section is the only rational procedure.

Convulsions.—The cause of the convulsions should be discovered and treated accordingly. For the convulsion itself treatment is sedative and eliminative. A hot mustard bath with cold applications to the head is the usual starting point. This is followed by a full dose of castor oil and an enema or rectal lavage. These eliminate intestinal toxins.

Chloroform will control the convulsion, but tends to further depress a heart already exhausted by toxæmia. If rapid control of the convulsions is necessary, $\frac{1}{2}$ -min. doses of liquor morphinæ [U.S.P. morphinæ tartratis gr. $\frac{1}{4}$] hypodermically, every half hour, for three doses, may be given, followed by a sedative mixture, containing 3 gr. doses of potassium bromide and $\frac{1}{2}$ gr. doses of chloral.

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TREATMENT OF PREMATURE CHILDREN.

The treatment of premature children is disappointing. They frequently do well for about a week or longer and then become withered, with a dry, parched skin, and die gradually from asthenia. The change is sudden in its onset, and seems to be associated with dryness of the tissues, due to lack of fluid. This is not surprising when one remembers the hot atmosphere in which the child is kept, the constant loss of fluid through the skin, lungs, kidneys and bowel, and the deficient means of making good this waste. It is often impossible to give such an infant more than a teaspoonful of fluid at a time, and it is difficult to compensate for the loss. Rectal injections supply the only means whereby a sufficient quantity of fluid may be absorbed. To make this means effective it is necessary to hold the child up by the heels; only in this way can an appreciable amount of fluid be retained. These injections should be administered very slowly, three or four times a day. To provide enough fluid at least $\frac{1}{2}$ oz. must be retained each time.

An equable and high temperature (80° to 90° F.) is important. To provide this the infant is completely wrapped up in warm cotton-wool, placed on a feather pillow, and covered by pulling the pillow cover over it. The temperature of the room should not fall below 65° F. It is well to screen the child from all draughts. This screen can be improvised by putting the pillow in a large wooden box placed on its side facing the fire. Hot water bottles under the pillow help to maintain the high temperature. A thermometer hanging in the box enables the nurse to regulate the temperature as required. This answers all the requirements of a costly incubator.

Late researches point to colostrum as an aid to digestion. It seems to have the power to promote the formation of the antibodies necessary for assimilation.

J. R. FREELAND.

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² J. M. Munro Kerr, "Operative Midwifery," 2nd edit., London, 1911.

OBSTETRIC OPERATIONS.

GENERAL CONSIDERATIONS.

Preparation of the Operator.—The operator should wear a linen overall, and, if possible, this should be sterilised. He must then most carefully prepare his hands and arms by thoroughly scrubbing them in hot water with a nail-brush and soap, particular attention being paid to the nails, and it is best to use running water, if such can be obtained. The soap having been removed with clean water, the hands and arms should be dried and then immersed in a solution of biniodide of mercury (1 in 2,000) for a short time, after which rubber gloves which have been previously boiled should be put on.

The use of rubber gloves should be imperative, as not only can they be rendered absolutely sterile by boiling, but also by their use the hands of the operator are protected, an immense advantage if the case happens to be a septic one.

In the operation of turning, owing to the slippery nature of the gloves, difficulty may be experienced in catching hold of the child, in which case it may be necessary to remove them.

Preparation of the Patient.—It is very important for the patient to be properly prepared as follows:

The *rectum* should be emptied with a soap-and-water enema, since the expression of *fæces* during the operation is certainly unpleasant for the operator, and perhaps dangerous for the patient.

The *vulva* should then be thoroughly cleansed with soap and water, and afterwards swabbed with a solution of biniodide of mercury (1 in 2,000), and if the vulval hairs are long they should be clipped. The greatest care must be taken, as failure to render the *vulva* as aseptic as possible exposes the patient to very definite risks of infection.

Some authorities prefer to give vaginal douches in all cases when operative interference is indicated; but this hardly seems necessary, except under the following definite conditions: (1) If the fingers or hand have to be inserted into the uterus; (2) if there is a vaginal discharge; (3) if the patient is known to have recently had gonorrhœa; (4) if the patient is septic from

previous manipulation or neglect. In all of these circumstances a douche of a solution of biniodide of mercury (1 in 4,000) should be administered.

Following the vaginal douche, if its use is indicated, or if not, after the vulva has been attended to, the *bladder* must be catheterised, and this must never be neglected, since grave injury may be inflicted on this organ, if operative measures are employed when it is full.

Preparation of the Instruments.—The instruments must be sterilised by boiling for twenty minutes, and if a small piece of carbonate of soda is placed in the water, they will not rust. After sterilisation the instruments should be put at once into a bowl of warm lysol and kept there ready for use. The instruments after being used should be cleaned by a thorough scrubbing with soap and water, or better still, with a solution of lysol, which is soapy in nature, antiseptic, and brightens the instruments.

COMYNS BERKELEY.

ANÆSTHETICS IN PREGNANCY AND LABOUR.

PREGNANCY.

THE advisability of giving an anæsthetic to a pregnant woman is often questioned, and, as she is advised to lead a quiet, ordinary life and to avoid excitement, it is reasonable that an administration should not be undertaken without due consideration. The anæsthetic drugs in ordinary use have no direct effect on pregnancy, and pregnancy is no contra-indication to their employment. Therefore, if an operation or examination is necessary or advisable, there is no reason to withhold an anæsthetic or postpone an operation from fear of the effect of the anæsthetic. The question is really one for the surgeon to decide; if the operation is to save life, there can be no question as to its possible effect on pregnancy; it must be performed, and the anæsthetic nowadays is as much a necessity as the operation.

If, on the other hand, the operation is one of expediency, the surgeon's duty is to consider whether the risk of interfering with the pregnancy is sufficient to refuse the benefits which the patient would receive from the operation, and carefully weighing the evidence to act according to his judgment. If he decides to operate, an anæsthetic should be given without hesitation.

The chief physiological change of importance from the anæsthetist's point of view occurs in the later months of pregnancy, when the uterus, rising high in the abdominal cavity, limits the rise and fall of the diaphragm, and thus tends to produce less perfect oxygenation of the blood and renders cyanosis more likely to occur.

In giving an anæsthetic to a normal individual it is always necessary to avoid undue cyanosis, and the two essentials to obtain this are maintenance of a free airway and the admission of a sufficiency of air or oxygen.

A woman in the later months of pregnancy will require rather more oxygen than a normal patient, and although a sufficiency can usually be obtained from the air it is often convenient to have a cylinder of pure oxygen ready to mix with the anæsthetic. To obtain a free airway the patient should be directed to breathe through the mouth, and if necessary a prop or gag may be placed

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between the teeth to ensure maintenance of oral breathing when unconsciousness commences. All clothing must be freely loosened.

The Choice of the Anæsthetic should be made on the usual lines. Nitrous oxide gas is taken well, but should be mixed with rather more air or oxygen than usual. Ether, chloroform, C.E. mixture and ethyl-chloride may all be given in suitable cases.

In eclampsia and severe vomiting of pregnancy ether and chloroform do not appear to have any specially harmful effect on the toxæmia.

In conclusion, when called upon to anæsthetise a pregnant woman, the anæsthetist may use any of the approved methods, and if possible should have a cylinder of oxygen at hand.

LABOUR.

To reduce or abolish the pain of labour the following methods are in use: (1) The inhalation of anæsthetic vapours; (2) hypodermic medication; (3) intra-spinal injection.

I propose to describe these three methods separately, and to make a few general remarks in conclusion.

The Inhalation of Anæsthetic Vapours.—The drug originally employed by Simpson for the relief of labour pains was chloroform, and chloroform is still used for this purpose almost exclusively in the British Isles. It is more convenient than ether for the accoucheur and pleasanter for the patient. It used to be held that the lying-in woman was specially immune from the dangers of chloroform and that it might be given to her without risk of a fatality. But although such accidents are very rare it is certain that fatalities have occurred, and some have even been recorded.

From the obstetrical point of view there are two degrees of anæsthesia, the so-called obstetrical anæsthesia or analgesia and the full surgical degree. The former is all that is called for in an uncomplicated labour, except perhaps during the passage of the head over the perineum, when a rather deeper degree approaching full surgical narcosis may be called for.

The latter (full surgical anæsthesia) is required when an obstetrical operation, such as turning, application of forceps, or craniotomy, has to be performed. So long as the degree of analgesia only is required and obtained chloroform may be said to be free from danger.

In a normal labour no anæsthetic is required, as a rule, in the first stage; but when, after full dilatation of the os, the actual

descent of the child begins, the pains become more severe and chloroform should be commenced.

The most convenient form of apparatus is Junker's inhaler, fitted with a flannel mask. The bottle should be fixed to the head of the bed, and the bellows should be fitted with two or three yards of tubing. During the early part of the second stage many a patient will hold the mask over her face and start squeezing the bellows as soon as she feels a pain coming on. As soon as consciousness begins to go she will cease squeezing and will get no more chloroform, until the commencement of a fresh pain rouses her to squeeze once more.

But in many cases the physician will have to do this for her. He should aim at no more than the mere abolition of consciousness during the pains, and should cease the administration in the intervals. When he wishes to make a vaginal examination or to rupture the membranes, or to perform any minor manipulations, he may continue the administration of chloroform by placing the bulbs of the bellows on the floor and squeezing with his foot. As the bulb to be squeezed is apt to slip about on the floor, it is convenient to have two thin pieces of wood hinged together along one side, with a loop in one of them which will hold the bulb. Intermittent pressure with a foot will leave both hands free, and there will be no risk of soiling them by touching the bellows. During the passage of the head over the perineum and distension of the vulval orifice a condition approaching full surgical anæsthesia is called for, and this can be obtained by more frequent pressure on the bellows.

After the birth of the child the anæsthetic should be discontinued and the third stage conducted without it.

In many parts of America and the Continent ether is used instead of chloroform in all labours, being given by the open method with a drop bottle and flannel mask. It has the advantage of being absolutely safe, and has not the tendency of chloroform to diminish uterine contractions. On the other hand, it is less convenient to administer and not so pleasant to take. Like chloroform, it should only be given to produce a condition of analgesia and should be stopped between the pains.

When an obstetrical operation has to be performed and full surgical anæsthesia is required, the accoucheur should obtain the services of a competent practitioner to take full charge of the anæsthetic. A nurse is not a competent anæsthetist, and no man can do two things properly at the same time. I am well aware this is a counsel of perfection which cannot always be carried out,

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but in the interest of the patient it should be done whenever possible. If he has to work alone, the physician will probably have to employ chloroform owing to its greater convenience, but if he can obtain the services of an anæsthetist, the latter should treat the case as an ordinary surgical operation and give the anæsthetic he considers appropriate to the patient. In the majority of cases ether will be found advisable. It can be given without risk to the full surgical degree by any of the approved methods. Cyanosis must be avoided, so that if a closed apparatus, such as Clover's inhaler, is used a free admixture of air must be ensured. If it is considered that ether is contra-indicated or if after a trial it is not well taken, the C.E. mixture (chloroform 2 parts, ether 3 parts) may be substituted and should be given on an open mask.

If the perineum is ruptured and has to be sutured, it is possible in many cases to put in the stitches without an anæsthetic, as the stretching of the parts renders them insensitive for a time. But when the tear is extensive or the patient sensitive, it is not possible to do the repair satisfactorily without anæsthesia, and here again a skilled assistant to take charge of the anæsthetic is a great advantage. In this case, also, ether or the C.E. mixture is appropriate, as a fairly full surgical anæsthesia is required, and the alleged immunity of the parturient woman to the dangers of chloroform is said to end with the birth of the child.

Ethyl-chloride has been recommended for short manipulations, such as making an examination, introduction of bougies, removal of placenta and membranes, or to produce a deep anæsthesia during the passage of the head through the vulval outlet.

It is undoubtedly a very convenient anæsthetic for such purposes, but it is an exceedingly powerful drug, and I should hesitate to recommend its use by anyone working single-handed.

Hypodermic Medication.—Of recent years, chiefly on the Continent, the hypodermic injection of a mixture of *scopolamine* and *morphine* has been practised and recommended for the relief of the sufferings of parturition.

The technique of the treatment is as follows: As soon as the pains become regular, strong and painful, recurring about every five minutes, the first injection is given consisting of: Scopolamine, gr. $\frac{1}{160}$ (gramme '0003); Morphine, gr. $\frac{1}{4}$ (gramme '01).

The solution must be freshly prepared and made with distilled or boiled water.

A second injection may be given in not less than an hour, and a third not sooner than two hours after the second. Two injections are usually enough. Some recommend that scopolamine only

should be given in the second and third injections. The room should be darkened and complete quiet be obtained.

Some patients have prolonged sleep after the injection, and are not aroused by the pains, others only sleep between the pains.

The most noticeable feature of this treatment is loss of memory for very recent events. The patients can be roused, are conscious of their surroundings and of their pains, and will give an intelligent answer to a question. Within a few minutes they have forgotten their last pain, and when a question previously asked is repeated, have no recollection of having but lately answered it. When labour is over, they remember nothing about it. When they begin to remember what occurred five or ten minutes before, it is an indication to repeat the injection.

The objections to the treatment are :

(1) It is uncertain ; some women react much more readily than others, in fact cases are met with which are not relieved at all ; (2) it is very apt to prolong labour by making the pains weaker and less frequent ; in the second stage the patient may refuse to make any bearing-down efforts ; it is therefore contra-indicated in primary weak pains, or in pains becoming weak from exhaustion ; (3) the child is more likely to be born with symptoms of asphyxia and to exhibit a disinclination to start breathing satisfactorily ; (4) the tendency to produce uterine inertia may continue during the third stage and predispose to retention of placenta and post-partum hæmorrhage.

The last three objections apply also, but in a less degree, to chloroform.

Intra-spinal Injection.—The method of producing anæsthesia by the injection of stovaine or some similar drug into the spinal theca, which has been extensively used lately in surgery, has also been applied to midwifery.

The injection is made in the same way as for a surgical case, between the third and fourth lumbar vertebræ. Rigid asepsis is essential and the shoulders must be slightly raised to prevent the vital centres in the medulla being affected. Anæsthesia is established within a few minutes, and the uterine contractions continue, but are completely painless.

The objections to this method are: (1) The procedure is not without risk ; it is early yet to formulate definite statistics of the dangers of spinal anæsthesia, but a sufficient number of fatalities and disabilities have occurred to make it clear that the method cannot claim greater safety than inhalation anæsthesia ; the dangers appear to be chiefly from sepsis, paraplegic symptoms (such as

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incontinence of urine and fæces), either temporary or permanent, and death from involvement of the medullary vital centres; (2) the lordosis which accompanies pregnancy makes the injection difficult; (3) the paralysis of the abdominal muscles prevents the valuable voluntary expulsive efforts of the second stage; (4) the anæsthesia produced usually passes off in from one to two hours, so that the injection may require to be repeated or chloroform given.

The great advantage of spinal anæsthesia is that it appears to abrogate surgical shock. Therefore, in cases, such as concealed accidental hæmorrhage or ruptured uterus, in which shock is a marked and dangerous symptom, the method is worthy of a trial.

Conclusions.—That it is the duty of the physician to relieve the agonising pains of child-birth is now happily beyond the realm of controversy. And it is at least equally clear that in doing so he must interfere as little as possible with the natural course of labour.

All the methods of relief described above tend to delay to some extent a normal labour. In the case of a so-called precipitate labour this action is an actual advantage, and in those cases in which the pain is so terribly severe that the efforts of the mother are directed to inhibit rather than assist the expulsion of the child, an anæsthetic will, in fact, hasten the progress of events.

In deciding which method offers the largest balance of advantages over drawbacks we must consider the question from the point of view of patient and then of physician.

From the patient's side of the question chloroform holds an overwhelming advantage. Its action is certain, which is more than can be said for scopolamine and morphine, and its effects on the progress of labour and the well-being of the child are not so detrimental. Stovaine involves the discomfort of the spinal puncture, presents greater risks to the mother, and its effects may pass off just when they are most desired. Over ether chloroform has the advantage that it is much pleasanter to take.

From the physician's point of view the hypodermic and the intraspinal methods have the sole advantage of convenience. One injection is given, and a repetition if necessary is only required after a comparatively long interval. This to a man working single-handed is a decided benefit. However, the experience of many years proves that chloroform can be given successfully and safely in the vast majority of labours, and the newer methods have not yet proved their claim to oust from its established place of honour the beneficent discovery of Simpson. Ether has less effect in weakening uterine contractions, but is less convenient to administer.

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When the pains in the first stage are so severe as to make some relief advisable, an injection of scopolamine and morphine is probably less objectionable than beginning chloroform so soon, and as the effect of the injection passes off chloroform may be used for the second stage.

To sum up :

First Stage. — No anæsthetic. If exceptionally painful, give scopolamine and morphine.

Second Stage.—Give chloroform with Junker's inhaler during pains.

For Obstetrical Operations.—If possible, obtain an assistant to give ether or C.E. mixture.

In Cases of Severe Shock.—Spinal stovainisation may be found useful.

LLEWELYN POWELL.

CÆSAREAN SECTION AND CÆSAREAN HYSTERECTOMY.

I PROPOSE considering Cæsarean section and Cæsarean hysterectomy separately, for the two operations occupy a very different position as regards the general practitioner. Conservative Cæsarean section is always a simple operation. The technique is simple and there are hardly ever any complications. Cæsarean hysterectomy

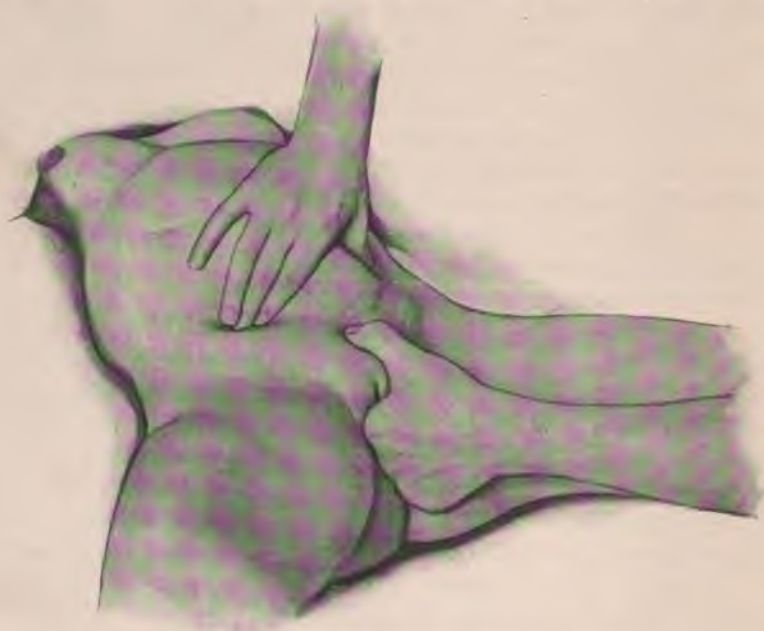


FIG. 1.—From Munro Kerr's "Operative Midwifery" (Baillière).

is on an entirely different footing. It can only be satisfactorily performed by an expert abdominal surgeon. I hope I am not misunderstood as regards Cæsarean section. I do not mean that it can be relegated to domestic practice and I would never support such an attitude, but it is an operation which in case of emergency can be undertaken by the careful general practitioner in a private house, and upon many occasions it has been successfully performed

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under such conditions. The one thing that is essential is absolute surgical cleanliness.

CÆSAREAN SECTION.

The operation of Cæsarean section consists in opening into the uterus through the abdominal wall, removing the child, stitching the uterine incision, replacing the uterus, and closing the abdominal wound. Until recent times extreme degrees of pelvic deformity was the only condition for which this operation was practised. Within the last few years, however, the field has been enlarged, and it is now employed occasionally for such conditions as ovarian tumours and fibro-myomata of the uterus complicating labour, eclampsia, and even certain cases of placenta prævia.

Contracted Pelvis.—In contracted pelvis Cæsarean section is indicated when a living child cannot be born *per vias naturales*, and in the case of a dead child when the risks of craniotomy are greater than those of Cæsarean section.

From my experience I have come to the conclusion that unless the child is very small Cæsarean section should be chosen whenever the conjugata vera is less than $3\frac{1}{4}$ inches. I do not mean to imply that it is never necessary at $3\frac{1}{4}$ inches or even above that figure, or that some other operation may not be substituted for it even at 3 inches; all I wish to imply is that at 3 inches or slightly above that figure it is usually advisable. When one is in doubt in the exceptional cases, the final decision must be arrived at by carefully estimating the relative size of the head and the pelvis; the method I have found best is the one illustrated (Fig. 1). The manœuvre is different from Müller's method, the essential difference being that I employ the thumb to estimate the extent to which the head overlaps the pelvic brim.

In recent years pubiotomy has been advocated as an alternative to Cæsarean section. But pubiotomy does not come into competition with Cæsarean section. If it has a place, and I believe it has a place, it is indicated in those cases in which the accoucheur, having carefully estimated the relative size of head and pelvis, has come to the erroneous conclusion that spontaneous delivery will occur, or at worst can be completed by moderate traction with forceps. He has been wrong in his estimate, and so, having pubiotomy in reserve, he employs it (*see Pubiotomy, p. 446*).

Turning now to the cases of extreme pelvic deformity, Cæsarean section is the only possible treatment when the conjugata vera measures less than $2\frac{1}{2}$ inches. Below that figure craniotomy is an operation of great difficulty and attended with a high maternal

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mortality. Even at 2½ inches, especially if there is a general contraction of the pelvis, the operation of craniotomy requires the greatest patience and experience.

Theoretically, Cæsarean section should always be performed if the child is alive, and craniotomy should only be employed if the child is dead. There are some who preach this doctrine, but personally I believe it is sometimes advisable to perforate a living child rather than do Cæsarean section. I frequently receive into my wards in the Glasgow Maternity Hospital cases in which labour is far advanced, in which many attempts at delivery have been made by midwives and practitioners, whose hands, I know, have not been thoroughly cleansed. In such cases I refuse to perform Cæsarean section, for I know that the maternal mortality is 20 to 30 per cent. I believe I consider not only the interests of the mother, but those of the State, in deciding against Cæsarean section in such cases. This question is more fully considered in connection with the mortality of the operation.

Ovarian Tumours and Fibro-myomata of the Uterus.—As regards ovarian tumours complicating labour, Cæsarean section is very rarely necessary. But in a few cases, in which the ovarian tumours are impacted in the pelvis, it has been found impossible to remove the tumour without previously emptying the uterus.

In the case of fibro-myomata matters are very different, for in this condition hysterectomy is generally the operation indicated. Everyone will admit, however, that simple enucleation of the tumour or tumours is a sound procedure in certain cases. But the operator must not adopt the attitude of the extremist and conserve the uterus when it is obviously too much damaged. To conserve a uterus, so much damaged by enucleation that a subsequent pregnancy would be extremely dangerous to the patient, is just as bad surgery as to remove a uterus unnecessarily.

Eclampsia.—Within the last decade there has been recorded a considerable number of cases in which Cæsarean section was employed for the condition of eclampsia. As the cases of eclampsia have been very serious the mortality has been naturally very high indeed (50 to 60 per cent.). This radical treatment might be thought of in cases in which the disease does not yield to the ordinary medical treatment usually employed, and where it is deemed necessary to empty the uterus rapidly. The operation, therefore, for this condition competes with *accouchement forcé* either by forcible dilatation of the cervix or incisions (vaginal Cæsarean section). Personally I think that ordinary Cæsarean section is preferable to the vaginal operation in the later weeks of pregnancy.

Placenta Prævia.—During the last two or three years there has been a considerable number of cases recorded in which Cæsarean section was employed. It is universally admitted, however, that the operation in placenta prævia is only very occasionally indicated. The case in which it may occasionally be the wisest treatment is a primipara with a very rigid cervix, who has reached full time and in whom there is the prospect of an extremely prolonged and difficult labour, if the child is delivered *per vaginam* by the ordinary recognised methods.

Preparations for Operation.—The patient upon whom Cæsarean section is to be performed is prepared for operation in the ordinary manner. If time permits, she should have her bowels thoroughly evacuated. In addition, she should be relieved of any bronchial catarrh so commonly present in rickety subjects. It is therefore advisable to have her in the hospital a day or two before operation. This residence in hospital prior to operation, however, is not always possible; as a matter of fact a great number of patients have to be operated upon hurriedly, without any preparation beyond an enema.

Until quite recently a great deal of importance was attached to the cleansing and sterilising of the abdominal wall prior to operation. Many operators, however, at the present time, have abandoned this extensive toilet and prepare the field of operation when the patient is placed on the operating table. At present the method most favoured is rubbing into the skin over the field of operation 3 per cent. iodine and chloroform solution. Personally I think the results are almost as satisfactory with such a preparation, and are indeed preferable to poulticing the skin with antiseptic lotions for a couple of days before operation. The method I am employing at present is shaving the pubis of all hair when the patient is admitted, scrubbing the skin with soap and water, and then applying a wet dressing (carbolic 1 in 40) for twelve hours. When that is removed, a dressing of sterilised gauze is applied. When the patient is placed on the operating table, the skin is washed with ethereal soap, spirit and biniodide of mercury (1 in 1,000). In my gynæcological cases acetone and tincture of iodine were employed for a time, but recently this method was given up, as stitch abscesses were more frequent. When the skin has to be prepared for the first time on the operating table, I prefer carbolic (1 in 20) to the iodide of mercury or iodine methods. Elaborate cleansing of the vagina with ethereal soap and douches I have given up, except in cases in which labour is far advanced or vaginal examinations have been made by individuals who have probably not cleansed their hands very carefully. But,

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as already explained, I rarely perform Cæsarean section on the latter class of case.

The operator requires one assistant besides the anæsthetist; both of them must cleanse their hands with great care, scrubbing them at least for ten minutes with soap and water, and then washing them with biniodide of mercury and spirit (1 in 1,000). Personally I employ and insist on my assistant and nurses wearing rubber gloves. These are put on dry and are pulled over the cuffs of the sterilised gowns; caps and masks may be worn, but they are not essential.

When the operator cannot obtain the assistance of two nurses, he and his assistant can arrange the instruments and swabs so that they can be readily reached by either of them. There should be two sets of swabs; one set should be large, about 1 foot square, with tapes attached at one corner; these are employed for packing off the intestines and surrounding the uterus, and I usually find about twenty of them are necessary. The other set should be smaller in size, and should only be used for mopping up any bleeding; they should never be placed inside the abdomen; forty to fifty such swabs are necessary.

The exact number employed of both lots should be carefully counted beforehand and again before the abdomen is closed.

The instruments employed are few and very simple, and they are the following: One scalpel, two pairs of stitch forceps, two pairs of scissors, one and a half dozen pressure forceps, six pairs of broad ligament clamps (in case it is found necessary to remove the uterus), one needle-holder, eight needles (four large and four small), catgut, silk, and silkworm-gut ligatures.

Time of Operating.—At this point it is advisable that I refer to the time for operating. It was the custom until a few years ago, and is still the recommendation of a few, to operate only after labour has been in progress some little time. Those who advocate this claim that, if the cervix is dilated, all blood clot forming in the uterus is readily expelled, in other words, that drainage is better and that post-partum hæmorrhage is less likely to occur. Others maintain that it is better, when one has the choice, to operate prior to the onset of labour, because one can choose the most suitable time in the day, and quietly make every preparation. These latter maintain that the uterus finds no difficulty in expelling any clots that may form in its cavity, and that the danger of post-partum hæmorrhage is theoretical. Personally I think there is much to be said in favour of operating before labour has commenced. In multiparæ I always do so if possible, and I have never seen any trouble result. On two occasions, however, in primiparæ

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considerable disturbance from after-pains followed, and so in them I prefer to operate shortly after labour commences.

Operating before labour commences is naturally only suitable for those cases in which there is absolutely no doubt that Cæsarean section is necessary. Should there be any possibility of the labour terminating spontaneously, by forceps, or by symphysiotomy, the patient must be allowed not only to go into labour, but the labour must be allowed to continue for some time before Cæsarean section is performed.

There is a danger in operating before the onset of labour, which some writers have referred to, viz., that one may occasionally perform the operation before term has been reached and so deliver a child distinctly premature. This is especially apt to occur in hospital practice, for the women are often so uncertain regarding the onset of pregnancy that it is sometimes impossible to estimate the age of the child. It was once my experience to deliver a child which, as far as could be judged after delivery, was not more than thirty-six weeks old. When, however, the patient's statements regarding the duration of her pregnancy are reliable, the likelihood of performing the operation much before term is reduced almost to vanishing point.

The operation of conservative Cæsarean section is just as easy in the pregnant as the parturient, and the uterus, I find, contracts equally well in both. When the uterus has to be removed, however, it is a distinct advantage to operate before labour, for there is a much smaller cervical stump to stitch, seeing that the cervical canal has not been enlarged by dilatation. When, therefore, hysterectomy is called for, the operation should be performed, if possible, before labour has started.

Immediately before commencing the operation a full dose of ergotin should be injected into the thigh. It is a mistake to give it too soon, especially if the labour has been going on for long, as there may be some little trouble in extracting the child and secundines.

The Abdominal Incision.—The abdominal incision most generally employed is a median longitudinal one of 7 to 8 inches in length, so disposed that two-thirds of its length is above the umbilicus and one-third below. Even the most inexperienced can hardly do any injury to the abdominal contents in dividing the parietes, for the enlarged uterus lies directly against the abdominal wall. Only when extending the incision upwards are the intestines likely to be encountered. It is advisable, however, that the operator proceeds cautiously and divides first skin, then sheath, muscle, and finally peritoneum. Any enlargement of the wound is made

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with scissors. All bleeding points should be secured with pressure forceps. If they are left on for a few seconds, it is usually sufficient to arrest all bleeding, but if preferred the bleeding points can be secured with fine catgut or silk. Having opened the abdomen, the intestines should be carefully packed off with gauze.

Uterine Incision.—Before proceeding to make the uterine incision the operator must decide whether he will open the uterus *in situ* or turn it out of the abdomen prior to making his incision in it. Arguments may be advanced in favour of both procedures. On the

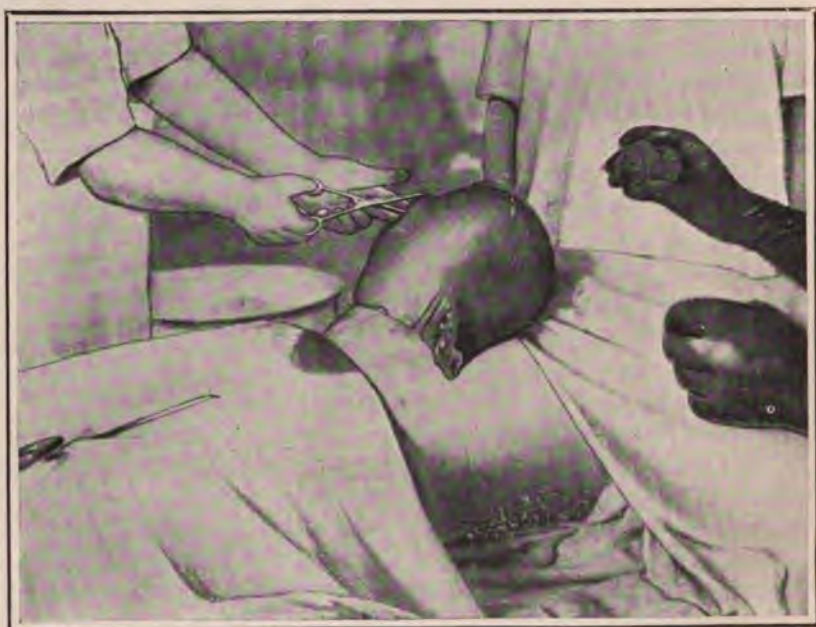


FIG. 2.—Enlarging the uterine incision. (From Munro Kerr's "Operative Midwifery," Baillière.)

one hand, by turning out the uterus and surrounding it with towels, the blood and liquor amnii from the uterus can be more completely prevented from soiling the peritoneal cavity; on the other hand, the large uterine surface is exposed, and a larger abdominal incision is required. My own practice is as follows: I open the uterus *in situ* in all cases when labour is not far advanced, when there has been no chance of vaginal infection and when the membranes are still intact; and I turn out the uterus prior to opening into it, if the membranes have ruptured some time beforehand, and in all cases where I am afraid that infection may have occurred.

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The uterine incision most commonly employed is a median longitudinal one extending downwards from the upper limit of the fundus. It should be about 6 inches in length. Many other alternative incisions have been suggested, and at the present time a lateral extra-peritoneal one is much in vogue in Germany. I shall refer to this incision later, when speaking of extra-peritoneal Cæsarean section. The majority of operators, however, favour the median longitudinal one.

When the uterus is turned out of the abdomen before being



FIG. 3.—The hand has been pushed through the membranes and a foot seized. (From Munro Kerr's "Operative Midwifery," Baillière.)

incised it is a simple matter to make the incision median, but when the uterus is still *in situ* in the abdomen it will usually be found necessary to twist the fundus round towards the left before making the incision, for the fundus of the gravid uterus is generally twisted round towards the right.

In cutting through the uterus the amount of bleeding varies, but it is always very considerable if the placenta is situated under the incision. I have found that in 40 per cent. of cases the placenta is situated on the anterior uterine wall, and is directly cut down upon. In order to avoid encountering the placenta it was suggested by

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Olshausen that the uterine incision should be made in the part of the uterine wall away from the placenta. But it is not always possible to tell beforehand where the placenta is situated, and besides it is of very little moment, even although one does cut down on the placenta.

Having cut through the uterine wall, the membranes when reached bulge through the wound. Two fingers should be quickly passed up between the membranes and uterine wall and the incision enlarged with scissors. Very frequently the membranes will be ruptured in the process, but this is of no consequence. (Fig. 2).

In order to control the bleeding from the uterine incision several devices have been tried. The most effective is to employ a tourniquet round the lower part of the uterus, but that favours uterine inertia and post-partum hæmorrhage. Another device is to temporarily clamp the broad ligaments. But these devices are quite unnecessary, as sufficient control can be secured by the operator and his assistant pressing on the uterus with a swab just outside the incision. Having opened into the uterus and enlarged the incision as described, the child should be quickly extracted.

Extraction of the Child.—The simplest way of extracting the child is to pass the hand into the uterus through the membranes or placenta and seize a foot. It is much easier to extract the child by the foot than by the head (Fig. 3).

There is seldom any difficulty in getting the child out of the uterus, but occasionally difficulties may arise. For example, if the liquor amnii has drained away and the uterus has retracted over the child there may be a little difficulty. Again, if the labour has been long in progress, and the lower uterine segment is markedly developed, Bandl's ring may grasp the head. I have, however, never experienced any great difficulty in extracting the child, and when I have seen others have difficulty, it has been because the uterine incision was too small or because the operator inserted and withdrew his hand once or twice before he secured the part he sought for. It is a good rule in obstetrics never to remove one's hand from the uterine cavity until one has seized whatever one intended to secure. Great harm results from repeated insertions and withdrawals of the hand. The only real injury which can be done in extracting the child is tearing the lower end of the uterine wound. I have frequently seen this done when the child was excitedly extracted. Whenever the child is extracted the cord should be clamped in two places and cut between and the child should be handed over to an assistant to be carefully attended to, for in many cases the child is born in a condition of apnœa.

Immediately the child is delivered the operator's chief assistant seizes hold of the uterus and surrounds it with gauze swabs.

Removal of the Placenta.—The placenta and membranes must be most carefully removed. The lowermost part is apt to be caught by the retraction ring and break off; with a little care, however, all the membranes are easily withdrawn. The general practice is to remove the placenta and membranes through the uterine incision. In cases operated on early in labour this is the only possible course and there is no objection to this procedure, but when the membranes have been ruptured for some time, and have



FIG. 4.—Conservative Cæsarean section. The assistant controlling the bleeding and bringing the edges of the wound together, prior to the operator introducing the sutures. (From Munro Kerr's "Operative Midwifery," Baillière.)

bulged down into the vagina, and possibly been infected by the repeated examination, it is a distinct danger to pull up the membranes through the uterine wound. I have advocated, therefore, in these cases that the placenta be detached and pushed down through the cervix into the vagina.

Stitching the Uterus.—It is generally recommended that the uterine sutures should be passed through the thickness of the uterine wall up to, but not including, the mucous membrane (Fig. 4).

Personally I agree with the late Dr. Cullingworth and other recent writers that no harm results from stitching through the whole thickness of the uterine wall. Indeed, if the placenta was situated on the anterior wall under the incision, I think it a distinct advantage, for in such cases the deeper portions of the uterine

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wound, being occupied by large sinuses, are very friable; consequently, in tightening the sutures, they are apt to tear through the deeper parts of the wall, and only the superficial parts are brought into apposition. The mistake is often made of stitching only the superficial layers of the uterine wound for the internal part is often retracted, and the whole internal surface of the uterus being raw it is difficult to exactly define the internal edges of the wound. This is one of the causes of a weak uterine cicatrix. The



FIG. 5.—The uterine sutures inserted. (From Muoro Kerr's "Operative Midwifery," Baillière.)

only possible objection to stitching through the whole thickness of the uterus is that the portion of the suture situated in the uterine cavity is liable to become infected and this infection may spread along the sutures. If infection of the uterus does occur, however, it is very questionable if the patient's chances would be any better, had the stitches not included the mucous membrane.

For many years I used catgut for suturing the uterus, but recently I have gone back to medium silk in cases which have not been interfered with. If there is any doubt about infection having occurred, then I prefer catgut, for silk becomes infected either from within or without, and most troublesome sinuses may form. This happened to

me in two cases, and in one a couple of sinuses persisted so long and annoyed the patient so much that I had to open them up and remove the silk stitches.

From eight to twelve sutures are usually required, and these are placed at a distance of about $\frac{1}{2}$ inch apart. In addition, a few fine superficial stitches are inserted between the others, wherever the edges of the wound are not in perfect apposition. A superficial Lembert suture is not necessary (Fig. 5).

If catgut is employed for suturing, a double knot is always desirable, and the superfluous portion of the suture must not be cut off too near the knot, for the uterus does not remain passive, but is frequently contracting and retracting, and so the knots are apt to come undone. This is no theoretical danger, for it actually occurred in one of my cases. This patient some eight hours after the operation showed signs of collapse. Unfortunately I was away in the country and could not get to see her, and those who were in charge, not appreciating fully the probability of internal hæmorrhage, did not care to open up the abdominal wound. At the post-mortem examination about 40 oz. of blood were found in the abdominal cavity, and two or three of the catgut sutures were untied.

The sutured uterus is now ready to be replaced in the abdominal cavity, but prior to doing this it should be firmly compressed with warm swabs, and all blood clot, etc., removed from the abdominal cavity. Such *débris* is usually found in front of the broad ligaments in the utero-vesical pouch, although a little may find its way down into Douglas's pouch. Having replaced the organ, the abdominal wound is closed.

I am convinced that the abdominal wound should be closed in layers. In Cæsarean section, however, the abdominal parietes are sometimes so thin that this is occasionally unnecessary. My usual practice is to stitch in three layers. I first stitch the peritoneum with a continuous catgut suture, then I place silkworm-gut interrupted sutures through the whole thickness of the abdominal wall except the peritoneum. Before tying these latter, I carefully bring together the muscle sheath with interrupted catgut sutures. This careful closing of the abdominal wound takes ten minutes longer than simple through-and-through stitching. It is, however, quite worth the time expended upon it. Before the wound is closed, it should be washed with normal saline solution and well dried.

After the sutures have been tied the wound is washed with 70 per cent. alcohol, and a simple dressing of sterilised gauze and gamgee applied. The dressing is not, as a rule, changed until the twelfth day, when the stitches are removed.

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Sterilisation.—This is probably the most suitable place for considering this question. With regard to this subject there appears to me to be three matters for consideration: (1) The ethical question; (2) the danger to the patient of the repeated operation; (3) the danger of rupture of the uterus during a subsequent pregnancy.

From *the ethical standpoint* the question of sterilisation is a very subtle and difficult one, but it is one which, without doubt, will be much discussed as the mortality from Cæsarean section falls. A most interesting discussion on the subject took place at a meeting of the American Gynæcological Society.¹ It followed the reading of a paper by Green on "Repetition of Cæsarean Section on the same Patient; the Experience at Boston Lying-in-Hospital." Green took a very strong position, as can be judged from the following quotation: "I venture to assert that the only safe and moral ground for the medical profession is that based upon modern medical science uninfluenced by sociological considerations. If a woman comes to Cæsarean section and recovers, she and her husband, if she has one, should be informed of her condition, and of the prognosis and treatment in the event of future pregnancy; if subsequent pregnancy ensues, the responsibility of treatment rests with the obstetric surgeon, but the responsibility of the condition rests elsewhere."

In the same discussion Whitridge Williams distinguished between "pauper patients" and "women in the upper walks of life." As regards the former he is reported to have said: "I do not believe we are justified in allowing pauper patients to be subjected to repeated Cæsarean section unless they particularly desire it." As regards the others he continued: "They should be made to share the responsibility with the physician. In such cases the husband and wife have the right to demand sterilisation, though I should earnestly dissuade them from it after the first operation, and point out to them the possibility of the subsequent death of the child and the absolute impossibility of having another after such an operation. If, however, the patient requires a second operation the matter should be left entirely in her hands; but my advice would tend in the direction of rendering her sterile at that time, as, no matter how favourable our results may be, an occasional death is bound to occur."

A similar discussion followed a paper read by me before the London Obstetrical Society.² Spencer, who has for many years consistently recommended the conservative operation, said: "The matter was an ethical one, to be decided entirely by the doctor, and that his duty was to deliver the woman and restore her as

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nearly as possible to a natural condition, a result obtained by the conservative operation without sterilisation, and not by the mutilating operation of hysterectomy, nor by the unreliable and dangerous one of tying the tubes. If the patient became pregnant again, the responsibility was not the doctor's whose duty was to repeat the Cæsarean section, which experience had shown to be very safe." Herman, on the other hand, is reported to have said: "It was for the patient to decide whether she would be sterilised or not." Cullingworth sided with Spencer, and Routh with Herman.

The *danger of repeated Cæsarean section* was gone into very fully by Wallace.³ Some years ago he found that the mortality worked out at about 9·5 per cent. Since then many cases have been reported, and the mortality has fallen much lower; indeed, speaking generally, it has fallen below the mortality of Cæsarean section performed for the first time.

A reason given for the lower mortality is the presence of extensive adhesions, which it is claimed shut off the general peritoneal cavity, so that the uterus may be evacuated without opening into the general peritoneal cavity. Now, while I admit that adhesions are usually found at a subsequent operation, they are seldom so extensive as to permit one to open the uterus outside the general peritoneal cavity. I have performed the operation twice on the same patient upon many occasions, but only once have I found it possible to open into the uterus without opening the peritoneal cavity.

The real reason why the repeated operation is safer is because the woman is watched carefully during the later weeks of her pregnancy and is taken into the hospital or a private home before labour is expected, and so is well prepared for operation.

Certain operators, for example, Sinclair and Wallace, have suggested encouraging adhesions to the abdominal parietes, and the former advocates stitching the uterus to the abdominal wall.

It has been my practice to sterilise patients after a second Cæsarean section, either by tying the tubes, or more generally, by removing the uterus. Only once have I performed the operation three times on the same patient. I find myself in agreement therefore with Whitridge Williams. I feel that a woman who has twice subjected herself to Cæsarean section has done sufficient for her family and the State. Others, however, look at the matter differently, and have repeated the operation three, four, five, and even seven times. I do not say that I will not ultimately follow their example, but at present I am not convinced it is the right treatment.

The *danger of the uterine cicatrix giving way* at a subsequent pregnancy or parturition is the chief argument advanced by those who are opposed to the conservative operation. The number of cases in which the uterine cicatrix has "given way" are numerous, but in this connection it must not be forgotten that until recently only a few were left unsterilised. Even at the present time the number left unsterilised is not great; but, relatively speaking, I would say there is a fair proportion in which rupture has occurred. The most recent work on the subject is an exhaustive monograph by Singer.⁴

In connection with these cases it is an interesting fact that in a large proportion the placenta was situated over the cicatrix of the previous Cæsarean section wound.

Without doubt, in many cases, the rupture is the result of imperfect suturing of the uterine wound. As I have already pointed out, this mistake is easily made, for the inner part of the wound tends to retract, and so the two surfaces are not brought into exact apposition. But not a few cases result from slight infection of the wound. To secure a sound cicatrix, everything must be done to prevent this complication.

Method of Sterilisation.—The method I have generally employed for sterilising the patient is removing a portion of the tube. As far as experience goes in the Glasgow Maternity Hospital, we have had no pregnancy occurring after such a procedure. There have been recorded, however, one or two cases; consequently, if one prefers it, the stump of the tube may be covered with a portion of the broad or round ligament. To effect sterilisation, it is quite unnecessary to remove the uterus. I do not agree with those who claim that, if the patient is to be sterilised, it is always better to remove the uterus.

After-treatment.—Exhaustive details regarding the after-treatment are not necessary, as the subject is fully considered in connection with the after-treatment in abdominal operations. I shall content myself with a few remarks on one or two matters which I consider worthy of attention.

In my experience the *sickness* and vomiting following Cæsarean section have not been so troublesome as after other abdominal operations. I have found them best controlled by giving the patient absolutely no fluid for twenty-four hours, and then only sips of hot water. If the sickness persists for more than twenty-four hours, I give the patient small doses of milk of magnesia, and should it still be very troublesome I wash out the stomach.

A very troublesome sequela in my experience has been *bronchitis*,

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especially in cases operated upon immediately after being brought into the hospital. For this and other reasons, already referred to, it is most desirable that the patient should be resident in the hospital a few days.

The complication most dreaded is, of course, *sepsis*, and the condition of the uterus is peculiarly favourable to such an occurrence.

On looking over the list of a long series of cases of Cæsarean section it will be found that a considerable number show evidence of more or less serious sepsis. In the vast majority of such cases the infection occurred prior to the operation, and was the result of the repeated vaginal examinations. Many operators, therefore, are disinclined to perform Cæsarean section if vaginal examinations have been made by anyone, midwives or doctors, whose asepsis is doubtful, because in such cases one cannot reckon on less than 20 per cent. mortality. In cases admitted to hospital untouched, and in cases in private practice not infected before operation, the mortality should be extremely low if every possible precaution is taken at the operation.

If sepsis should manifest itself, there are three courses open : (1) To trust to the resistance of the individual, the course usually followed ; (2) to douche out the uterus, a procedure not free from risk ; (3) hysterectomy.

The third is the soundest course of procedure whenever the condition becomes serious, for infection begins in the interior of the uterus and spreads from there into the peritoneal cavity or more frequently by the lymphatics.

As regards *dressing the wound*, that, as a rule, is not necessary until the stitches are removed on the tenth or eleventh day. The patient is allowed up on the seventeenth or eighteenth day, and leaves the hospital at the end of four weeks. No abdominal belt is necessary. In the majority of cases the patient can nurse her child by the second or third day after operation.

EXTRA-PERITONEAL CÆSAREAN SECTION.

During the last two years this method of operating has been much discussed and very strongly advocated, more especially in Germany. The procedure generally considered best is the one associated with the names of Latzko and Doderlein. The cellular tissue is opened up on one side, the bladder pushed over towards the opposite side, and the lateral wall of the lower uterine segment opened into. The child is delivered with forceps. It

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is quite unnecessary to consider this operation, nor is it advisable at the present time, for it is very questionable if it will ever be generally adopted. Those interested in the matter will find an exhaustive criticism of the method in a paper by Schauta, of Vienna.⁵

CÆSAREAN HYSTERECTOMY.

The modern operation of Cæsarean hysterectomy consists in removing the whole of the uterus except a small portion of the cervix and covering the stump of the cervix with peritoneum. It is often erroneously referred to as Porro's operation. Now Porro's operation consisted in bringing the small stump of the uterus outside the abdomen, a procedure which has been abandoned almost entirely. Some few operators still recommend it for septic cases, but the majority advocate total extirpation of the uterus for such a condition.

I have indicated that the ordinary operation of Cæsarean section is a simple one unattended with any complications or difficulties except in most exceptional cases, and that in consequence it is an operation which any medical man should be capable of performing. Cæsarean hysterectomy, on the other hand, as I have already stated, is an operation requiring considerable operative experience, and consequently should not be undertaken except by an operator skilled in abdominal surgery. Speaking broadly, the operation is indicated whenever it is deemed dangerous to leave the uterus behind. Now it is dangerous to leave the uterus behind in the following conditions: (1) Carcinoma and fibro-myoma of the uterus; (2) certain cases in which the uterus is chronically inflamed and degenerated, and in which "concealed accidental hæmorrhage" has occurred; (3) complete atony of the uterus after removal of the child; (4) septic uterus; (5) ruptured uterus.

(1) **Carcinoma and Fibro-myoma of the Uterus.**—It is obvious that in cases of carcinoma of the cervix complicating pregnancy or labour the entire uterus should be removed. If the carcinoma is too far advanced to permit this, many prefer Cæsarean section and supra-vaginal amputation of the uterus to delivering the child *per vaginam*, the idea being that by the former procedure the risks of severe laceration, bleeding and sepsis are obviated.

As regards fibro-myoma the uterus should only be removed if it is deemed inadvisable to perform myomectomy.

(2) **Cases in which the Uterus is Chronically Inflamed and Degenerated and in which "Concealed Accidental Hæmorrhage" has occurred.**—Concealed accidental hæmorrhage in its

grave form is such a serious condition and the results have been so unsatisfactory with the ordinary methods of treatment that some operators in recent years have advocated Cæsarean hysterectomy. A considerable number of successful cases have been recorded, and it is quite probable that this new treatment will meet with general support in the future.

(3) **Complete Atony of the Uterus after Removal of the Child.**—It occasionally happens that there is complete atony of the uterus after the child is extracted. The condition, however, is a very rare one. In the eighty cases operated upon by myself and my assistants we have only found it necessary on one occasion to remove the uterus for this condition. Other operators have had a similar experience.

(4) **Septic Uterus.**—Personally I am entirely opposed to Cæsarean section when there is a probability that the uterus has been infected. I prefer to have recourse to craniotomy in such cases, for I consider it is better to save the mother for future pregnancies than to risk her life with such a serious operation. Speaking generally, this is the attitude adopted by British obstetricians; but in some centres on the Continent of Europe and in America a different attitude is adopted. In certain cases, if Cæsarean section is performed, the safest procedure is to remove the uterus completely.

(5) **Rupture of the Uterus.**—In cases of rupture of the uterus I believe the best results are obtained from complete hysterectomy with drainage of the lacerated cellular tissue.

The Operation of Cæsarean Hysterectomy.—The modern method consists in securing the uterine and ovarian vessels on both sides by ligatures, amputating the uterus supra-vaginally, stitching the stump, and finally bringing the peritoneum by a continuous suture over the stump, a method which is often referred to as "retro-peritoneal" or "sub-peritoneal" treatment of the stump. The details of the operation are briefly as follows: The patient is placed in the Trendelenburg position, and the intestines are carefully walled off with swabs. All hæmorrhage from the wound in the uterus is first controlled by firm pressure with swabs, by a long clamp, or by rapidly stitching up the uterine wound. The uterus is pulled over to one side and then to the other, so as to allow the operator to reach the broad ligament. Ligatures are now applied, first to the round ligaments and then to the ovarian vessels, either beyond or on the uterine side of the ovary, according as one decides to remove or leave the latter behind. In passing these ligatures through the broad ligament one must avoid puncturing the large veins which are frequently

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present. A clamp is then applied close down the side of the uterus, to control any bleeding from the ovarian vessels on the uterine side. The tubes and ovarian vessels are then cut. Any vessels which have not been included in the ligatures are carefully tied, and for the sake of safety I always apply a second ligature round the ovarian vessels.

The securing of the uterine vessels, the next step, is the only troublesome one in the operation. Prior to carrying it out, however, the peritoneum on the anterior uterine wall should be divided transversely just above where it is reflected on to the bladder. In doing this the peritoneum alone should be seized with dissecting forceps and cut across. If one catches it carelessly the subjacent cellular tissue, which contains numerous dilated vessels, will be injured, and profuse bleeding will result. The bladder is then pushed down out of the way with a gauze swab. The peritoneum upon the posterior aspect of the cervix is then divided and slightly separated at the point where the cervix is to be cut across.

One has now opened up the lower part of the broad ligament, and uterine vessels of each side can be readily seen and felt. The vessels are secured by ligatures passed well round them close by the cervix to avoid injuring the ureters, although there is really not much chance of doing this, if the bladder has been pushed well out of the way and the ligature is not passed too deeply and too far away from the cervix.

Having secured both uterine vessels, they are cut close by the uterus. Here, again, any vessels that have not been embraced in the ligatures are carefully tied and a second ligature applied. The second ligature I always introduce with a needle, and, in order to make sure that it does not slip, I take a slight hold of the surrounding tissues. The cervix is now steadied with volsellum forceps and cut across. Not infrequently at this stage several vessels require to be understitched, just at the margin of the cervix. Any other bleeding points should be searched for, and it is advisable in doing this to relieve the stump from any traction exerted upon it by the volsellum forceps which is steadying the stump, for traction is sufficient to arrest slight bleeding. In cutting across the cervix it is not necessary to make a V-shaped incision, but if the cervix is not taken up one should scoop out a portion from the middle part.

There now remains only the stitching of the stump. Prior to doing this, however, I am in the habit of swabbing out the cervical canal with pure carbolic; others use the Paquelin cautery or dissect off the mucous membrane. I do not attach great importance

to these steps, and many operators dispense with them altogether. The actual stitching of the cervix must be done with care. I usually do it in two layers. The sutures, which are of catgut, are passed through the anterior and posterior walls of the cervix, but do not include the mucous membrane. The amount of stitching that is necessary depends upon the width of the cervix. In the case of a cervix that has been fully dilated the stump to be stitched is very broad, five deep and two or three superficial sutures being required, while on the other hand, if the cervix has not been dilated and the stump is quite small, two deep and one or two superficial sutures only are necessary.

Having again satisfied myself that there is no bleeding point unsecured, the peritoneum is carefully stitched over the stump, and the raw surfaces of the broad ligaments are brought together with a continuous catgut suture. All blood clot is now removed, and a pint of normal saline solution is poured into the abdomen. The closing of the abdominal wound has been referred to already.

Panhysterectomy.—When the uterus has to be removed, a few operators prefer total hysterectomy, especially in septic cases; it is also indicated in carcinoma of the cervix and in certain cases of uterine myoma and rupture of the uterus.

The steps in the operation are, up to the point of tying the uterine vessels, the same as those followed in supra-vaginal amputation. The bladder must now be pushed further down, and the tissues around separated from the cervix and the upper part of the vagina. The latter is then clamped with forceps curved at the ends, one clamp being placed lower than the other. The vagina is then divided between them. In the non-pregnant this is a simple matter, but in the parturient the canal is so wide that it is a little more difficult. This double clamping is to prevent any of the uterine and vaginal discharges contaminating the peritoneum. The anterior and posterior vaginal walls are then stitched together, or, if it is thought better, a small opening is left, through which a gauze and rubber drain is inserted and pushed into the vagina.

Mortality from Cæsarean Section and Cæsarean Hysterectomy.—I shall here only refer to the operation undertaken for contracted pelvis. I and my assistants have performed these operations eighty times during the last ten years. There have been seven deaths, a mortality of 8·7. That is about the average if all kinds of cases are taken into account. Some exceptionally good results have been obtained by Gow (forty-two cases), Barber (thirty-nine cases) and Russell (Glasgow) (twenty-nine cases), without any

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deaths. As regards this aspect of the subject the most valuable monograph in the English language is by Amand Routh.⁶ The most important of his many interesting tables is the following :

TABLE SHOWING THE MORTALITY OF CÆSAREAN OPERATION FOR CONTRACTED PELVIS WHERE DETAILS ARE GIVEN AS TO POSSIBLE INFECTIVITY (1891 TO 1910).

Condition.	Cases.	Maternal Deaths.	Percentage Mortality.
A. Not in labour	245	9	3·6 per cent.
B. In labour, membranes unruptured	224	5	2·2 „
C. In labour, membranes ruptured .	166	18	10·8 „
D. Frequent examinations or attempts at delivery.	64	22	34·3 „

This interesting table shows how very important it is to operate early in labour and how disastrous it is to do so late in labour after attempts at delivery have been made.

As regards the foetal mortality little need be said. Routh, in his collected cases, found it was 4·8 per cent. The operator must make absolutely sure immediately before he begins the operation that the child is alive. Except in extreme pelvic deformity (conjugata vera under 2½ inches) it almost amounts to a disgrace to deliver a dead child; craniotomy should have been chosen in such a case.

It is unnecessary to consider the mortality from Cæsarean hysterectomy, for it is usually performed for extremely grave conditions as I have already indicated. The one exception is when the operation is undertaken for fibro-miomata of the uterus. In such cases the mortality is very low and only slightly above the low death rate (3 per cent.) now obtained in hysterectomy performed under ordinary conditions.

J. M. MUNRO KERR.

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CRANIOTOMY.

CRANIOTOMY is an operation which is now very much less often resorted to than was formerly the case, because it is felt, and rightly so, that the life of the child should not be sacrificed if it can be saved by any other method of delivery, always supposing that the risk to the mother is not thereby increased. In recent years the perfecting of surgical technique has made Cæsarean section so safe that with a few exceptions it is a preferable operation to craniotomy. In very prolonged labour the child is apt to be born dead or to survive its birth but a very short period. In such a case craniotomy may be the best treatment, as, of course, it is if the child is dead or the mother is septic, unless this operation subjects the mother to a greater risk than Cæsarean section.

Indications.—(1) If the child is dead, and its delivery by craniotomy does not endanger the mother more than Cæsarean section.

(2) Hydrocephalus.

(3) When repeated attempts have been made to deliver the child either by forceps or version, and these have failed. In such cases the child is probably injured and the genital canal perhaps infected.

(4) When from the condition of the patient it is obvious that the genital canal has been infected.

(5) In maternal complications, such as eclampsia, heart disease, and ante-partum hæmorrhage, when it is necessary to deliver the child as quickly as possible, the cervix not being sufficiently dilated for delivery by forceps.

(6) When labour is obstructed by a contracted pelvis, tumour of the pelvic bones, fibroid of the uterus, solid or cystic ovarian tumour, cancer or organic rigidity of the cervix, and then only if Cæsarean section or coeliotomy, as the case may be, has been refused or is not indicated.

Delivery by craniotomy should not be attempted in a contracted pelvis if the antero-posterior diameter at the brim is less than $2\frac{1}{2}$ inches, for, although it can be accomplished with a conjugate as low as 2 inches (if the transverse diameter measures 4 inches), by an expert operator, the mortality resulting is so great—38·5 per cent. according to the latest statistics—that Cæsarean section

even under adverse circumstances is a safer operation. The proper treatment for tumours obstructing labour is to remove them, if possible, and then deliver the child, the alternative treatment of craniotomy being, apart from the sacrifice of the child, contra-indicated, since the tumour during the extraction of the child may be injured and the mother's life consequently endangered.

(7) Some cases of vertex, breech, and brow presentation. In cases of unreduced occipito-posterior and unreduced mento-posterior presentation, craniotomy must be performed if the other methods of delivery by rotation or axis-traction forceps have failed. It is well to remember, however, that when the chin is posterior it may turn forward very late, so that, having failed to rectify the



FIG. 1.—Perforating child's skull.

malposition by manual rotation, the operator should wait as long as the mother's condition justifies before resorting to instrumental delivery.

In breech presentation impaction from extension of the head or the occiput not rotating forwards may render craniotomy necessary.

In brow presentation, if treatment by rectification or version fails or cannot be attempted because the head has advanced too far, craniotomy is indicated, except rarely when forceps may be successful.

(8) Locked twins. When both heads present and lock, if the head of the second child cannot be pushed out of the way, and forceps applied to the first head fail to deliver it, craniotomy will have to be performed on the first child.

Position of the Patient.—*See* remarks under Forceps Delivery (p. 417).

Position of the Operator.—*See* remarks under Forceps Delivery (p. 417).

Anæsthetic.—An anæsthetic is necessary, and should be given to the full surgical degree by another practitioner.

STAGES OF THE OPERATION.

Perforation.—*Vertex and Brow Presentations.*—(1) If the head is above the brim, an assistant should push on the fundus of the uterus so that the head may be fixed. If the head is impacted in the pelvis, there is no need to use counter-pressure.

(2) The operator passes two fingers of his left hand into the vagina on to the anterior parietal bone, keeping to the centre of the os uteri.

(3) He then holds the perforator as depicted in the illustration and passes it up to the skull, guarding its point with the fingers during its passage up the vagina (Fig. 1).

(4) Having drawn back the instrument to the perineum so that the point of the instrument may impinge on the skull at right angles, the operator with firm and steady pressure bores through the parietal bone. It is better to bore through a parietal bone than through a fontanelle, since the hole resulting will not close when the instrument is withdrawn.

(5) The instrument having been pushed as far as its shoulders into the skull, its blades are separated by approximating the handles and then closed, after which the instrument is turned half a circle and the blades again separated. By this means the hole is enlarged. The blades are then closed and the perforator is pushed on into the brain, which is destroyed. Special care should be taken to break up the medulla oblongata, otherwise, if the head is delivered quickly, the child may cry. The crotchet is a better instrument to destroy the brain with than the perforator, and with it also a good deal of the brain can be scraped away.

(6) The best way to remove the brain after it has been broken up is by a stream of water delivered into the cranial cavity through the perforation hole by means of a douche. It is not, however, absolutely necessary to do this.

Dangers in Perforating.—The operator must be very careful not to mistake the promontory of the sacrum for the head.

If the perforator is pushed forwards with a jerk, its point may slip off the skull and seriously damage the bladder or vagina.

Face Presentation.—In this case the roof of the mouth or the orbit should be perforated.

Breech Presentation.—If the after-coming head gets impacted, the skull must be perforated through the occipital bone.

Crushing.—To reduce the size of the skull after it has been perforated it must be crushed. This crushing may be effected either through the means of the pelvis or by some special instrument, according to which method of delivery is chosen.

Pelvic Crushing.—If the child is delivered by version, the



FIG. 2.—Cranioclast in position when used as a tractor only.

craniotomy forceps, the crotchet, or the vertebral hook, these will simply act as tractors and the pelvis will do the crushing.

Instrumental Crushing.—The forceps, cephalotribe, cranioclast, and three-bladed cephalotribe act as crushers as well as tractors.

The various methods of extracting the child after perforation will now be described. Of these, the most generally useful are by means of the cranioclast and cephalotribe.

Cranioclast.—This instrument has taken the place of the old-fashioned craniotomy forceps, since it can be used both as the craniotomy forceps and for the operation of cranioclasm, for which it was devised. The best instrument is that designed by Roper.

Used as Craniotomy Forceps. — When used in the place of craniotomy forceps, the cranioclast acts as a tractor only.

(1) The fingers of the left hand are passed into the vagina and carried up to the hole made by the perforator.

(2) The solid blade, guided by the right hand, is introduced through the perforation hole with its toothed surface looking towards the occipital or frontal bone, preferably the former, and held in position.

(3) The fenestrated blade is then gently inserted between the fingers and the scalp over the occipital or frontal bone, according to

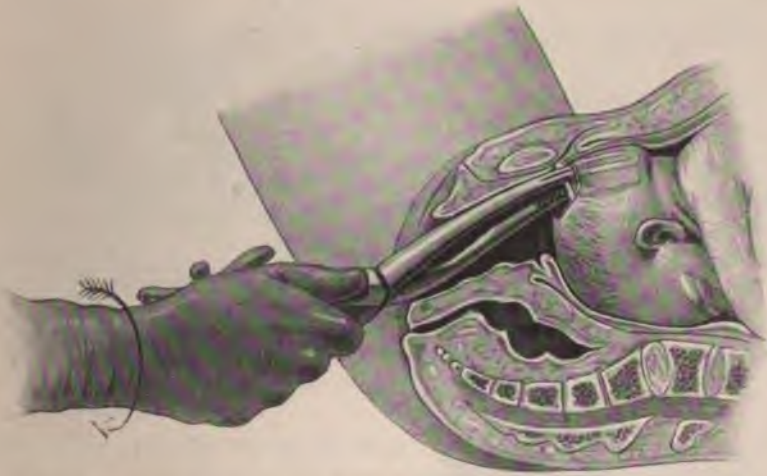


FIG. 3.—Cranioclast in position, when used in the operation of cranioclasm.

whether the toothed surface of the solid blade is directed towards one or the other.

(4) The handles are next screwed tightly together.

(5) The head is now delivered by traction in the axis of the genital canal, care being taken to ascertain meanwhile that the instrument is not slipping and that the genital canal is not being injured by the lacerated edges of the skull (Fig. 2).

Used as a Cranioclast.—The operation of cranioclasm consists in breaking up the vault of the skull and removing the bone; afterwards inducing a face presentation and delivering.

(1) The fingers of the left hand are passed into the vagina and carried to the perforation hole.

(2) The solid blade is passed through the perforation hole guided by the right hand and held in position.

(3) The right hand then guides the fenestrated blade up to the *hole* in the scalp, and then on between the scalp and the bone of the *skull*.

(4) The handles are then screwed up tightly.

(5) The cranioclast is next twisted from side to side till the *piece* of bone that it grasps is loosened (Fig. 3).

(6) The instrument is now withdrawn until the piece of detached bone in its grasp is free of the scalp, after which the end of the instrument and piece of bone are surrounded by the fingers of the



FIG. 4.—Cephalotribe in position and skull being crushed.

left hand and all three withdrawn from the genital canal. By this means the danger of wounding the genital canal with the piece of detached bone is avoided.

(7) This manœuvre is repeated till as much as possible of the vault has been removed.

(8) The operator now brings the chin forwards and adjusts the mutilated skull till the face presents.

(9) A vertebral hook or crotchet may then be fixed in the mouth, orbit, or base of the skull and the child extracted, or the cranioclast may be put to its third use, that of a crusher, especially if the pelvis is very contracted.

(10) In this case it is better to first fix the skull with the vertebral hook, after which the fenestrated blade is passed under the chin and the solid blade over the base of the skull; both blades are then approximated as closely as possible by means of the screw, and the face is crushed. A tighter grip is thus obtained; that part of the skull engaging in the conjugate is reduced to its minimum, and with steady traction the child is delivered.

Dangers of Cranioclast.—Sepsis from the introduction of micro-organisms. Laceration of the soft parts from the sharp edges of the pieces of bone removed during the operation of cranioclast.

Cephalotribe.—The cephalotribe acts as a crusher and a tractor.

(1) The fingers of the left hand are passed into the vagina and inserted between the head of the child and the cervix.

(2) With the right hand the two blades are introduced after the manner described in the forceps application. The handles are then locked and the screw tightened till the ends of the blades meet. To ascertain when this has occurred, the operator should have made a note as to the distance between the ends of the handles when the tips of the blades are in apposition before the instrument is applied (Fig. 4).

(3) The method of extraction will now depend upon whether the pelvis is generally contracted or flattened, and further, in the latter case, whether the head has entered the pelvic cavity or is arrested above the brim.

(4) When the pelvis is generally contracted or the head is arrested in the cavity of a flattened pelvis, the child is delivered by traction only.

(5) If, however, the head is arrested above the brim in a flattened pelvis, then the cephalotribe must be rotated a quarter of a circle before the crushed head is pulled through the brim. By this manœuvre the longest diameter of the crushed head, which was before parallel to the true conjugate, is brought into the transverse diameter of the pelvis, where there is more room, and the smallest diameter of the head is brought into the smallest diameter of the brim. Traction is now applied and the child delivered.

Difficulties.—The chief difficulty, when using the cephalotribe, is to apply the blades over the broadest part of the skull. If this is not done, the blades will tend to slip as the screw approximates them.

The left hand must therefore be passed up to the blades from time to time to ascertain their position as the screw is being tightened, and if they are slipping either forwards or backwards;

according to whether they have been applied in front or behind the greatest diameter of the head, the screw must be loosened and the blades moved either forwards or backwards, as may be necessary, by adjusting the handles.

Dangers.—Apart from the danger of sepsis from the introduction of germs, care must be taken to prevent laceration of the vagina by the sharp edges of the perforated bone. After the crushing is complete, therefore, and before exerting traction, an examination should be made for any sharp pieces of bone, and, if found, they should be removed with a strong pair of crocodile forceps.

Relative Merits of the Cephalotribe and Cranioclast.—By means of the cranioclast as used in the operation of cranioclasm, a head can be pulled through a smaller conjugate than with a cephalotribe. Thus by inducing a face presentation and using the cranioclast to crush its vertical diameter, that portion of the skull engaging in the conjugate can be brought as low as $1\frac{1}{2}$ inches, whilst with the cephalotribe the lowest diameter that can be obtained is 2 inches. Again, if the pelvis is generally contracted, the cranioclast used as a tractor will effect delivery more easily than a cephalotribe, since in the former case the pelvis itself will reduce the diameter of the skull in all directions, whilst if the cephalotribe is used, the instrument, whilst diminishing the head in one diameter, tends to increase it in the opposite. Whilst, therefore, by rotating the cephalotribe this alteration in shape can be used to advantage in cases of flat pelvis, in cases of generally contracted pelvis or cancer of the cervix this instrument is not the best one to use.

The operation of cranioclasm is a difficult operation, and takes a much longer time to perform than cephalotripsy. In England, cases of extreme pelvic contraction are rare, and the chances of such escaping notice before labour sets in are fewer than they used to be. The results from Cæsarean section are now so much better than formerly that this operation has taken the place of craniotomy, especially when the contraction is marked. It, therefore, matters little which instrument a medical man purchases before starting practice. He will be wise to keep to one instrument. The increased dexterity obtained by practice with one instrument more than counterbalances any advantage there may be in having the choice of two.

Most operators find that a firmer grasp and a quicker delivery is obtained with the cephalotribe.

Auvard's Three-bladed Cephalotribe.—This instrument consists of one solid and two fenestrated blades.

(1) The solid blade is first passed through the perforation hole into the cranial cavity, and well up to the base of the skull.

(2) One fenestrated blade is now applied over the face, if possible, an assistant steadying the head externally.

(3) The blades are approximated by turning the screw until the fenestrated blade catches in the slot in the shoulder of the instrument. Care must be taken to ensure that a good grasp is obtained and the front part of the head is crushed.

(4) The second fenestrated blade is then passed over the occiput, locked, and the back part of the head is crushed by turning the screw until the fenestrated blade catches in the other slot in the shoulder of the instrument.

(5) The crushed head is then delivered by traction, the operator rotating the head or not, as may be necessary, after the manner described in the operation of cephalotripsy.

Relative Merits of Auvard's Cephalotribe.—This instrument has met with a certain amount of adverse criticism from some English authorities, most of it of a theoretical nature, emanating as it does from those who have apparently never used the instrument.

It is an instrument somewhat more difficult to apply than the cephalotribe or cranioclast, and its particular merits are rather limited to those cases in which the pelvic deformity is marked; but in these it shortens materially the time occupied in delivery.

Forceps, Crotchet and Vertebral Hook.—Delivery by these instruments is, as a rule, inadvisable, as owing to the risk of their slipping and injuring the soft parts not sufficient force can be exerted during extraction.

The crotchet is passed into the cranial cavity and its point fixed on some portion of bone. Then with the fingers of the left hand on the scalp, counter-pressure is made. It is rather more suitably used, when the after-coming head has been perforated.

The crotchet can also be fixed in the mouth or orbit. The vertebral hook can be used in a way similar to that of the crotchet.

Version.—Version may be employed in the absence of any contra-indication, if the operator has not got a suitable instrument to crush and extract the head with, or if he has failed with such an instrument. It must be remembered that during version the arm of the child may become extended, which would then further diminish the amount of space available for the head, so that version in these cases is certainly contra-indicated if the pelvic deformity is at all marked.

Extraction of the Body.—If the pelvic contraction is marked, or the child is larger than normal, much difficulty may be

encountered in delivering the body. In this case traction with the cephalotribe may be assisted by using the blunt hook in the axilla, by pulling down the two arms and pulling on these, or by the operation of cleidotomy.

Cleidotomy.—By this operation the clavicles of the child are divided with a strong pair of scissors, passed up under cover of the left hand between it and in front of the child.

Extraction of the After-coming Head.—Generally in these cases after the head of the child has been perforated, the head can be extracted quite easily by traction on the child's feet. If this is insufficient, the cephalotribe can be applied to the crushed head or the crotchet passed into the cranial cavity, and traction with the instrument combined with that on the legs will generally prove successful.

COMYNS BERKELEY.

DECAPITATION.

Indications.—(1) When with a transverse presentation version cannot be effected.

(2) When with a transverse presentation the uterus is tonically contracted or the ring of Bandl can be felt.

(3) When the child is dead and any difficulty is experienced in turning.

(4) When, on attempting podalic version, the leg of the child becomes detached, as it may do if the child has been dead for some time.

(5) In locked twins, when the after-coming head of the first child is impacted by that of the second, or by the shoulder and arm of the second child lying transversely.

(6) In a thoracopagous monster, when the first head is presenting at the vulva and the second is jammed in the pelvis, the first head should be decapitated.

(7) In a dicephalous monster, when both heads present and labour is obstructed, the first head must be decapitated and the monster delivered by version.

Instrument.—The operation is best performed with a Ramsbotham's hook. Some operators prefer a serrated edge in place of the sharp one, contending that the vertebral column is thereby more easily severed.

The neck can also in an emergency be severed with a strong pair of scissors, but not nearly so rapidly.

Position of the Patient.—*See* remarks under Forceps Delivery (p. 417).

Position of the Operator.—*See* remarks under Forceps Delivery (p. 417).

Position of the Child.—*See* remarks under Forceps Delivery (p. 417).

Anæsthetic.—An anæsthetic is necessary, and should be given to the full surgical degree by another practitioner.

Steps of the Operation.—(1) The arm, if not already prolapsed, should if possible be brought down, and a piece of tape tied to it, so that a firm grasp may be obtained.

(2) The prolapsed arm is pulled upon firmly so as to get the neck as low as possible.

(3) The left hand is then passed into the vagina and between the neck and the front of the pelvis.

(4) The decapitating hook, protected by the palmar surface of the left hand and fingers, is then passed up the vagina with

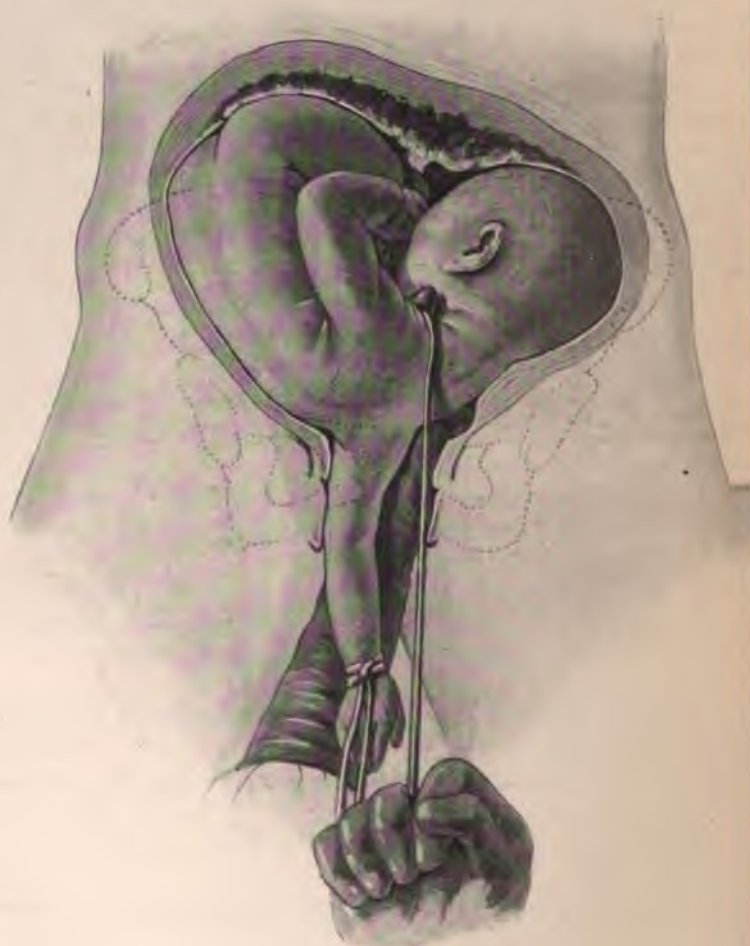


FIG. 1.—Decapitation.

right hand between it and the foetus until the hook is above level of the neck.

(5) The hook is next turned back at right angles so that it rounds the upper border of the neck.

(6) The index fingers of the internal hand are passed be-

the neck to feel the point of the hook and ensure that it is free. (Fig. 1).

(7) The hook is now pulled strongly downwards and at the same time moved from side to side, when the soft tissues of the neck and the vertebral column will be easily divided.

(8) The body of the child is then extracted by pulling on the prolapsed arm.

(9) The decapitated head is lastly delivered in one of the following ways: By the natural expulsive forces, by pressure on the fundus, by forceps, by inserting the finger, crotchet, or vertebral hook in the mouth and delivering the head as a face.

If the pelvis is contracted, the head may have to be perforated and then delivered with the ordinary forceps, craniotomy forceps or cephalotribe, or by the crotchet or vertebral hook inserted through the perforation hole.

(10) The decapitation of locked twins or double-headed monsters is best carried out with a pair of strong scissors.

Dangers. *Wounding the Maternal Soft Parts.*—The bladder may be injured unless care is taken to apply the hook so that the point is directed backwards. The soft parts of the mother may be wounded by the sharp edges of the cut vertebrae when the head or body is being extracted, or by the hook slipping as the last part of the neck is severed. If the index finger of the internal hand is kept on the point of the hook, there will be no danger of it slipping.

The uterus may be ruptured through carelessness, or because its lower segment is so stretched that the necessary manipulations cause it to tear.

Sepsis.—Great care must be taken to prevent sepsis by the use of indiarubber gloves and other methods already indicated. After delivery the uterus should be washed out with a hot douche of 1 in 4,000 biniodide of mercury, followed by one of sterile water.

Difficulties. *Contracted Pelvis.*—The head may be so high up that the neck cannot be reached. This may occur (a) if the pelvis is contracted, when evisceration will have to be performed, perhaps followed by spondylotomy; or (b) if spontaneous evolution has commenced, in which case it should be assisted by traction on the breech by the fingers, blunt hook, or crotchet hooked over the groin.

Bad Direction of Cut.—Care must be taken by keeping the finger on the point of the hook to ensure that it is cutting through the neck and not in a slanting direction through the thorax.

EVisCERATION.

THIS operation consists in removing the viscera from the thorax and abdomen of the child to allow of its delivery.

Indications. (1) *Impacted Shoulder Presentation.*—It is sometimes impossible to decapitate the child when its shoulder is impacted owing to the neck being too high up, and this is more especially likely to happen when the mother's pelvis is contracted.

(2) *Distended Abdomen or Thorax of the Child.*—The thorax or abdomen of the child may be distended with fluid (hydrothorax, ascites), and the abdomen with tumours of the kidneys, ovaries, spleen, liver, or bladder.

Position of Patient.—*See* remarks under Forceps Delivery (p. 417).

Anæsthetic.—An anæsthetic is necessary, and should be given to the full surgical degree.

Steps of the Operation.—(1) The body of the child is steadied by an assistant pulling on the prolapsed arm.

(2) The operator next passes his left hand up to the thorax or abdomen as the case may be, and then with his right hand carries up a perforator or pair of sharp-pointed scissors along the flat of his left hand and with it opens the thorax or abdomen.

(3) The viscera are next removed.

(4) The child is then delivered either by passing the fingers over the groin and pulling on the breech, or with the crotchet or craniotomy forceps fixed in the thorax or abdomen.

(6) The uterus is washed out with 1 in 4,000 biniodide of mercury, followed by a douche of sterile water.

Difficulties.—Even after evisceration it may be impossible to deliver the doubled-up body of the child, in which case the operation of spondylotomy, that is, bi-secting the vertebral column, must be performed.

COMYNS BERKELEY.

FORCEPS.

FORCEPS should only be applied to the head.

Indications for their Use.—It may be necessary to use forceps under the following conditions: (1) Because of some disproportion between the child and the maternal pelvis; (2) to assist delivery in the interests of the mother; (3) to hasten delivery in the interests of the mother; (4) to hasten delivery in the interests of the child; (5) because of some malposition of the child.

(1) **Disproportion between the Child and the Maternal Pelvis.**—Labour may be delayed either because the child's head is too large, the mother's pelvis is too small, or at times, a combination of the two.

Whatever the cause, the obstruction may take place in the pelvic cavity, at the brim, or above the brim of the pelvis.

The particular line of treatment to be followed, of course, depends upon the amount of disproportion (in most cases, the amount of pelvic contraction); but as we are now dealing with forceps delivery, it may be taken that with a normal-sized head the smallest conjugate which justifies an attempt at forceps delivery is $3\frac{1}{4}$ inches, and then only very occasionally, since below $3\frac{1}{2}$ inches the foetal mortality is markedly increased, for whilst, according to the figures given by Munro Kerr, the foetal mortality down to $3\frac{1}{2}$ inches is 10 per cent., between $3\frac{1}{2}$ and 3 inches it averages 30 per cent. The danger to the mother is likewise increased below $3\frac{1}{2}$ inches. It may, therefore, be taken as a good working rule that delivery with forceps, except on the rarest occasions, should not be attempted with a conjugate below $3\frac{1}{2}$ inches, and it must be remembered that even then, if the pelvis is of a generally contracted type, a somewhat larger conjugate is advisable.

In connection with labour in cases of contracted pelvis, the figures given by Bœnninghausen and quoted by Munro Kerr, are very striking, showing as they do that the foetal mortality for spontaneous delivery in generally contracted pelves is 2·2 per cent., and for flat rachitic pelves 2·7 per cent., while in artificially terminated labours the mortality is 41 per cent. and 47 per cent. respectively, according as the pelvis was generally contracted or

flat. With a conjugate, then, down to $3\frac{1}{2}$ inches in flat pelves, and $3\frac{3}{4}$ inches in those generally contracted, the labour should be allowed to terminate spontaneously if possible, as it will be safer both for the mother and child, assistance with forceps being given if the mother shows signs of exhaustion, the life of the child appears to be in danger, or the pains begin to fail.

The operator must, however, be particularly careful to take into account not only the size of the pelvis, but also that of the child's head, since, if the head is larger or smaller than normal, the foregoing remarks must be modified.

Delay above the Brim.—The best treatment to employ when the head is arrested above the brim, owing either to its increased size or to pelvic contraction, has formed the subject of endless discussion for years, and is not even yet definitely settled. Nevertheless, whatever may be the best treatment for expert obstetricians who had passed a long term of years in the service of a lying-in hospital, there is no doubt that the majority of practitioners should not use forceps in such cases. The harm done every year by doctors endeavouring with brute force to pull children's heads past the brim is incalculable, a marked percentage of the material mortality and morbidity, and of the fœtal mortality, being due to such misapplied efforts.

If the pelvis and head are of normal size, and the head is floating above the brim for some reason other than disproportion, then the high forceps operation is permissible, and may be particularly indicated in such cases as hæmorrhage, eclampsia, excessive obliquity of the uterus, prolapse of the cord, or some other complication endangering the life of the mother or child.

Delay in the Pelvic Brim.—When the head is arrested in the pelvic brim, and a careful examination shows that it is obviously not too large or the pelvis too small to allow of delivery, ample time should be given for the head to mould, the patient then placed in Walcher's position, and one or two efforts made to pull the head through the brim. No prolonged traction must, however, be exerted, neither must much force be employed.

The statement just made needs qualifying, since whether one is justified in using forceps depends not only on the relative sizes of the pelvis or head, but also, if the delay is due to the diminished size of the pelvis, upon the shape of the pelvis.

In the case of a flat pelvis the child's head has the best chance of passing through the brim, when its long diameter corresponds to the transverse diameter of the pelvis, when the anterior fontanelle is on a level with or lower than the posterior fontanelle,

and when the sagittal suture is nearer the promontory of the sacrum, that is, when the presentation is what is termed an anterior parietal presentation. If the sagittal suture is nearer the symphysis pubis than the promontory of the sacrum (posterior parietal presentation), the head, unless the degree of contraction is only very slight, will be unable to slip through the brim, and if it is already tightly fixed, it must be perforated, whilst, if the unfavourable presentation is discovered early, version is the proper treatment.

If, in addition to the flattening from rickets, there is a lateral spinal curvature (scolio-rachitic pelvis), the promontory is pushed not only forwards, but also laterally, with the result that there will be more room on one side of the promontory than on the other. In this case, if the child's head is entering the brim with its occiput turned towards the side in which there is most room, well and good, the case is suitable for forceps. If, however, the occiput is pointing towards the opposite side, version is indicated, for by pulling on that leg of the child which corresponds to the side of the pelvis in which there is most room, the occiput can be made to enter the wider space. Therefore, if there is more room on the right side of the pelvis, pull on the right leg of the child, and *vice versa*.

Lastly, if the pelvis is of the generally contracted type, then the child's head must be markedly flexed to enable it to pass the brim.

Delay in the Pelvic Cavity.—If the head is somewhat larger than normal, or the cavity of the pelvis smaller, the head may become more or less impacted. On examination it is found not to recede in the intervals between the pains, when there may be some difficulty in pushing it back, and the caput succedaneum is noticed to be larger than normal and increasing in size.

In this case, if the child is dead, the uterus tonically contracted, or the vagina and vulva swollen, the head should be perforated. If these conditions are absent, the forceps should be used. If by their aid no appreciable advance of the head results, then, even if the child is alive, craniotomy must be performed.

(2) To Assist Delivery in the Interests of the Mother.—

When labour is delayed by primary uterine inertia, rigidity of the pelvic floor, threatened rupture of the perineum, or abnormal obliquity of the uterus, it is better to assist labour by the forceps.

Primary Uterine Inertia.—In this condition the uterus, although contracting, does so with less force and frequency than usual. This is the condition in which forceps are most often indicated

and used. If, therefore, the cervix is fully dilated, and the head, though advancing slowly, has been in the vagina for two hours, the child should be delivered with forceps.

Rigidity of the Pelvic Floor.—In certain primiparæ, especially when comparatively old, the pelvic floor is more rigid than normal, and also in multiparæ as the result of injury at a previous labour the soft parts at the outlet may be rigid. The birth of the head, even though it is resting on the perineum, may then be considerably delayed. In these cases ample time must be given for the parts to dilate, failing which the head may be delivered with forceps between the pains.

Threatened Rupture of Perineum.—If the membranes rupture early and the liquor amnii drains away, the general intra-uterine pressure or guiding force is lost, and the fœtal head is pushed back on to the perineum by the direct uterine pressure. This will cause delay in the birth of the head and increase the liability to rupture of the perineum. By the judicious use of forceps in these cases the head can be pulled forwards in the direction of the vaginal outlet, labour will be shortened, and the risk of perineal rupture diminished.

Abnormal Obliquity of the Uterus.—If the uterus is displaced forwards more than usual or the lateral obliquity is greater than normal, the head may fail to engage in the brim, when, supposing the case is otherwise suitable, forceps are indicated.

(3) **To Hasten Delivery in the Interests of the Mother.**—In such conditions as exhaustion, ante-partum hæmorrhage, heart disease, phthisis, and eclampsia, rapid delivery may be indicated.

Exhaustion of the Mother.—If during the second stage of labour the maternal pulse-rate increases beyond 100 during the intervals of the pains, and yet no cause other than that of exhaustion can be found to account for this rise, labour should be terminated by forceps.

Ante-partum Hæmorrhage.—In accidental and unavoidable hæmorrhage, if the head is presenting and the membranes are ruptured, forceps should be applied and the child delivered when the cervix is fully dilated.

Heart Disease.—Death from heart disease during or just following labour is, as a rule, due to over-distension of the right side of the heart, and the danger of this is increased by the uterine contractions and bearing-down efforts of the patient. In these cases, therefore, when the patient is distressed and compensation has failed, labour should be terminated by the early application of forceps.

Eclampsia.—In this disease, if the various methods available do not control the fits, delivery should be effected as soon as possible, although the measures employed should not appreciably add to the risks the mother is already incurring. Thus in the second stage forceps may be applied at once, whilst if the first stage is slow and the case is otherwise suitable, dilatation of the cervix may be aided with a de Ribes' bag or the hand, and forceps delivery then effected.

(4) **To Hasten Delivery in the Interests of the Child.**—If the child is subjected to prolonged pressure, as, for instance, when the membranes rupture early in the first stage, or if the cord is prolapsed or expressed, the life of the child is placed in considerable jeopardy.

Fœtal Distress.—When labour is delayed, a careful watch must be kept on the fœtal heart. Diminution and especially irregularity of the fœtal pulse-rate are dangerous signs, and if the pulse falls to 100 between the uterine contractions, the child should be delivered forthwith.

Prolapse or Expression of the Cord.—If the cord cannot be replaced and the child is alive, forceps must at once be applied and the child delivered, always supposing that the cervix is fully dilated and the head presenting.

(5) **Because of some Malposition of the Child.**—In the following conditions forceps may be indicated:

Unreduced Occipito-posterior Presentation.—If the attempts at reduction of an occipito-posterior presentation by flexing the head or by manual rotation have failed and the occiput has rotated back into the hollow of the sacrum, the head must be delivered by forceps.

In these cases most authorities are content to use simple traction, in which case the best pattern of forceps to employ is the axis-traction, since the possession in these of a universal joint allows the head to rotate during the traction.

Another method less frequently practised is to rotate the head with forceps; but when thus employed they are very apt to slip, and may thus injure both the child's head and the mother's soft parts. Unless straight forceps are used this method has still further disadvantages, since the presence of the pelvic curve makes laceration of the soft parts more liable, and when the head has rotated, if traction is still necessary, the forceps must be removed and re-applied, although this latter drawback may be obviated by putting on the forceps backwards in the first instance.

Mento-anterior Presentation of the Face.—In cases in which the

face is delayed in the cavity of the pelvis and the chin is pointing forwards, the forceps may be used.

Unreduced Mento-posterior Presentation of the Face.—In mento-posterior cases attempts at reduction by extending the head or by manual rotation having failed and the chin having rotated back into the hollow of the sacrum, forceps should be tried before perforation is resorted to, unless the child is dead; but it must be remembered that delivery by forceps in such a presentation is not only most dangerous to the child, as its trachea is very apt to be compressed, but also when the ordinary forceps are used, failure to deliver generally results, as the instrument is so apt to slip. It is, however, a fact that very often in these mento-posterior cases the chin will turn if sufficient time is allowed. Therefore, whilst the child is alive, the application of forceps should be delayed as long as the mother's condition warrants, and if in the end forceps have to be used, then the axis-traction pattern will be found to be the most useful on account of the screw fixing the blades and preventing them slipping.

Brow Presentation.—If the brow has entered the cavity of the pelvis and is then arrested, a trial may be given to forceps before the head is perforated unless the uterus is tonically contracted, when no time should be wasted in attempting delivery with forceps.

Delay of the After-coming Head in Breech Presentation.—In breech presentation, if the after-coming head is delayed from extension, and delivery by the Prague method or jaw-and-shoulder traction has failed, forceps must be employed.

Prolapse of the Child's Arm by its Head.—If this condition causes delay and the arm cannot be pushed up, forceps should be applied, but care must be taken that the arm is not included in the blades.

Locked Twins.—If the heads of both children are presenting, push the head of the second away and pull on that of the first with forceps.

If the first child has presented as a breech and the second as a vertex, and manipulation has failed to disentangle their heads, the first child should be decapitated, and the second child delivered with forceps, after which the decapitated head of the first child is extracted.

Choice of Forceps.—The best pattern of forceps to use is that known as the *axis-traction forceps*. With this instrument traction can be applied to the greatest possible advantage, because the force will be acting in the true axis of the genital canal, and also the head will be able to rotate freely. Again, as the traction is exerted

in the best direction, the amount of force required is very much reduced, so that the liability of injuring the mother or child is



FIG. 1.

diminished and the operator is able to deliver the child, using the right hand only for traction.

cold, in which the child, if asphyxiated, may be immersed if necessary.

Post-partum Hæmorrhage.—The danger of post-partum hæmorrhage is perhaps a little increased with forceps delivery, more especially if chloroform has been administered or it has been necessary to deliver the child in the absence of uterine pains. The operator should therefore be particularly careful to control the uterus and to ensure beforehand that there is ready an ample supply of hot water, that the douche apparatus is in working

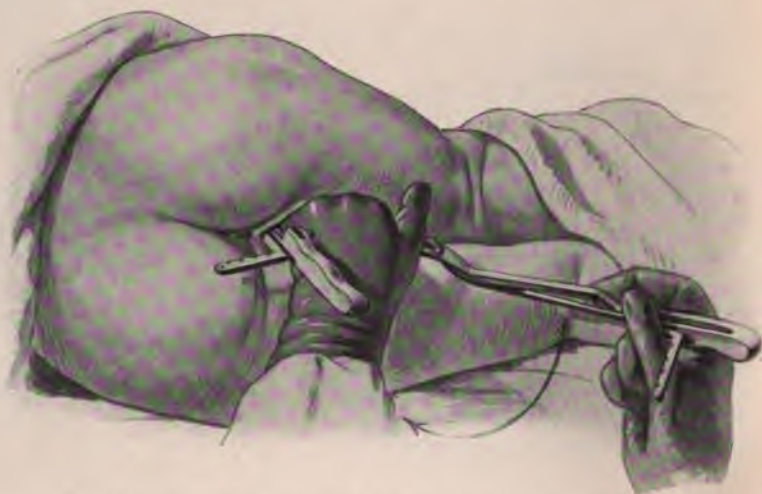


FIG. 3.—Applying upper blade of axis-traction forceps.

order, that a suitable douche is prepared, and that a dose of ergot is ready to hand.

Method of Applying the Forceps. Long Curved Forceps.—*Introduction of the Lower Blade.*—The operator passes as much of his left hand as may be necessary into the vagina with the palmar surface looking upwards, until the finger-tips impinge on the lower side of the head, where this is in contact with the cervix or vagina, according to whether the cervix has retracted above the head or not. The finger-tips are then gently insinuated between the cervix or vagina and head.

The lower blade, being held *lightly* in the right hand with the handle somewhat raised and pointing forwards, is then passed along the palmar surface of the left hand until the point impinges on the angle between the fingers and child's head (Fig. 2). The handle is now carried gently upwards and backwards, and then downwards

and backwards until the shank rests against the perineum, when the blade, if properly applied, will be lying between the left side of the pelvis and the child's head, in which case the outer surface of the handle will be looking directly upwards. The handle should then be kept in position by an assistant, so that the shank is in contact with the perineum; failing this, the operator must keep the blade steady with his left wrist whilst the upper blade is being passed.

Introduction of the Upper Blade.—The position of the left hand



FIG. 4.—Extracting head through vulval orifice. Right hand reversed.

is now reversed so that the palmar surface looks downwards and the finger tips are applied to the upper side of the head.

The upper blade, being held lightly with the handle pointing forwards and somewhat downwards, is passed gently along the palmar surface of the left hand, until the point impinges on the angle between the fingers and the child's head (Fig. 3).

The handle is now carried downwards and backwards and then upwards and backwards until it comes in contact with the handle of the lower blade, and, if properly applied, the blade will be lying between the right side of the pelvis and the child's head, and the outer surface of the handle will be looking directly downwards.

Locking the Blades.—The blades should now lock without any trouble. Difficulty may be experienced, if the blades have not been passed the same distance and consequently each half of the lock is not in apposition. In this case either one blade should be withdrawn a little or the other pushed in. Again, the blade may have rotated after its introduction so that the outer surface of the handle does not look directly upwards, and this is more likely to happen if the help of an assistant to hold the lower blade firmly in position has not been available. In this case the blade may be very gently rotated back to the right position, or the malposition may be rectified by carrying both shanks firmly back against the perineum, or it may be necessary to remove the blades and re-apply them. After the blades are locked, a careful examination should be made to ensure that only the child's head is grasped by the forceps.

Method of Extraction.—The middle finger of the left hand is placed in the loop of the shank and the index and third fingers rest on the shoulders of the handles (if the Simpson-Barnes, which is the best pattern of the long curved forceps, is being used), whilst the handles are held firmly with the right hand.

Direction of Traction.—The line of traction is constantly shifting, since it should be in that axis of the genital canal in which the head is lying at the moment it is being pulled upon, so that when the head is high up at the brim, traction is exerted directly backwards in a line joining the umbilicus and coccyx, and then as the head descends the line of traction is gradually advanced forward, so that at the end the handles are guided over the maternal abdomen. Traction, as a rule, should only be made during a pain. If for any reason, however, it is desired to deliver the child quickly, then the efforts at extraction should be intermittent, some interval being allowed between the pulls in the interest of the child.

When the forceps are being used to overcome resistance of the soft parts, traction may be employed in the intervals of the pains so as to gradually stretch the perineum, and this will lessen the chance of its rupture. As a rule when the head has been brought down on the perineum, the forceps should be removed and the uterus allowed to expel the child. This will lessen the chance of a perineal rupture. If, however, it is decided to deliver the head with forceps, the nurse must raise the upper leg of the patient, and when the head commences to escape from the vulval orifice, the operator should remove his left hand from the forceps and with it press the head forward, whilst with his right hand he should take hold of the handles in such a way that, instead of pulling on them, he pushes them towards the mother's abdomen (Fig. 4).

Strength of the Pull.—The amount of force to be applied cannot properly be indicated; it will vary with the case, and is purely a matter of experience. It is certainly quite unjustifiable for the operator to employ such a force that can be obtained by counter-pressure with his foot against the side of the bed. The force should not be greater than that which a man of average strength can exert with his two forearms.

Axis-traction Forceps.—*Introduction of the Blades.*—Both blades are introduced in a similar way to those of the long curved



FIG. 5.

forceps, the traction rods being attached and held by the right hand in contact with the handles.

Locking and Screw.—The traction rods are now pulled behind the handles, the blades are locked, and the screw is turned until the handles are sufficiently fixed. The traction handle is lastly fixed to the end of the rods.

Method of Extraction.—The same precautions must be taken when delivering with axis-traction as with long curved forceps. The position of the handles acts as a guide to the direction in which traction is to be made; the traction rods should therefore always be in contact with the shanks of the forceps (Fig. 5).

The screw must be loosened during the interval of the pains, or, if the pains are absent, during the intervals of traction. When

the head is at the outlet, the forceps should be removed, though, if necessary, delivery is easily completed with their aid.

Forceps in Occipito-posterior Positions of the Vertex.—In this condition it is best to use axis-traction forceps, as then, if the occiput tends to rotate as it is coming down, there is nothing to hinder it doing so. On the other hand, if the long curved forceps are being used and it is noticed that the occiput is rotating, they should be taken off to see if rotation will not be completed.

Forceps in Delay of the After-coming Head in Breech Presentations.—Delivery by the Prague method or by jaw-and-shoulder traction having failed, the forceps can be applied if the head has passed the brim. In this case, if the occiput is anterior, the arms and legs of the child must be carried by an assistant as far forwards as possible between the mother's legs, after which the forceps are applied posterior to the child's body.

If the occiput is posterior, the body of the child must be carried back as far as possible and the forceps are applied in front of the child's body.

Dangers of Forceps Delivery.—*To the Mother.*—If the cervix is not fully dilated, there is great danger of serious laceration, and many cases of rupture of the uterus are due to the careless use of forceps under these circumstances.

The vagina and vulva may be badly torn during forceps delivery if the blades slip, or if there is any marked disproportion between the head of the child and the pelvis of the mother, or during the delivery of an unreduced occipito- or mento-posterior position.

The operator should be careful to stand firm during traction. A slip has resulted in the shanks of the forceps suddenly impinging on the vulva, severely lacerating it. This slip is more likely to occur, if a piece of oilcloth or a rug has been placed at the side of the bed for the operator to stand upon.

Serious laceration may also result if the forceps are used as levers to rotate the head.

The blades of the instrument have been forced through the vaginal vault into the peritoneal cavity by careless operators.

Post-partum hæmorrhage may result, if the child is delivered quickly or in the interval of a pain.

Unless the greatest care is taken in the preparation of the patient and the instruments, sepsis may result, and unless the bladder is emptied before extraction it may be torn, and a vesico-vaginal fistula result.

To the Child.—There is a definite risk to the child during forceps delivery, the number of children lost as the result of this operation

approaching 8 per cent. Death is due to fracture of the skull, hæmorrhage into the brain, meningeal hæmorrhage, and asphyxia from compression. In addition, facial paralysis, cephalhæmatoma, and laceration of the scalp may result.

Action of Forceps.—Forceps can be used as tractors, compressors, levers, and rotators. The first of these is the principal use they are put to. Compression should only be called into action during traction. The necessity for the leverage action is very rare, and the advantage gained is not very marked, whilst the danger of lacerating the genital canal is great; it should, therefore, only be employed by a very experienced operator.

Position of the Blades of the Forceps in relation to the Maternal Pelvis and Fœtal Head.—In forceps delivery as practised by most practitioners the blades are passed so that they may lie in direct relation with the sides of the pelvis, without any consideration as to the position of the child's head. In the majority of cases forceps are applied for delay in the second stage of labour when the head of the child is low down and the occiput has rotated forwards, in which case the blades of the forceps will also be applied to the side of the child's head, in this instance then, in the best position. Again, when the head is arrested in the transverse diameter of the brim, the best position of the blades for the child's head necessitates their being applied at the sides of the pelvis. Thus it comes about, that in most cases without any particular knowledge or direct intention on the part of the operator, the forceps are applied in the best position both for the mother and child. Many authorities, however, have considered that an attempt should always be made to apply the forceps in the best position for the child, maintaining that if this is not done, and the forceps are applied in the usual way to the sides of the pelvis quite irrespective of the position of the child's head, the pressure of the blades may alter the position of the child's head to one that is not so suitable. The anterior-posterior diameter of the head may lie in three positions; oblique, transverse, and antero-posterior.

Oblique.—When the delay is at the brim and the head is occupying one oblique diameter, the child's head may be grasped transversely, that is in the best position, if the forceps are applied so that the blades lie in the other oblique diameter; that is to say, with the patient in the left lateral position, and, for example, a first vertex presentation, the lower blade should be over the left sacro-iliac synchondrosis and the upper blade over the right ilio-pectineal eminence.

If the delay is at the outlet and the occiput has not yet quite rotated forwards, the forceps may be applied in a similar way.

Transverse.—If the head is delayed at the brim, and is lying in a transverse diameter, the blades are best applied one over the occiput and the other over the face, which will occur if the forceps are applied in the usual way.

Antero-posterior.—The blades should be applied to the sides of the head, as they will be if the forceps are passed in the manner already described.

A Comparison of the Relative Advantages of Forceps and Version. *Forceps: Advantages.*—(1) In all varieties of pelvic contraction, except the scolio-rachitic, forceps are preferable to version, since the foetal mortality accompanying their use is very considerably less.

(2) Greater force can be applied in extracting the child.

(3) The necessity for rapid delivery, and the risk of premature respiration are not present.

(4) Perforation of the fore-coming head, if forceps have failed to deliver, is easier than that of the after-coming head if version has failed.

Disadvantages.—(1) When applied in the usual way, that is, with the blades lying against the side walls of the pelvis, forceps tend to turn the head from a transverse diameter into one of the obliques.

(2) Forceps favour flexion of the head. This may or may not be a disadvantage according to the shape of the pelvis concerned.

(3) Delivery with forceps cannot be effected through quite such a small conjugate as it can with version.

Version: Advantages.—(1) If there is more room on one side of the pelvis than the other, the bi-parietal diameter can be made to occupy the greater space by turning the child.

(2) Version can be performed with a cervix which is too small to allow of the application of forceps.

(3) Delivery can be effected through a conjugate of rather a smaller diameter with version than with forceps.

Disadvantages.—(1) During extraction the arms and head of the child are apt to become extended.

(2) The foetal mortality is greater with version than with forceps.

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INDUCTION OF ABORTION AND PREMATURE LABOUR.

PREGNANCY may have to be terminated before term either in the interests of the mother or of the child. If the pregnancy has to be terminated before the child is viable, the procedure is known as the induction of abortion; subsequent to viability, it is termed the induction of premature labour.

INDICATIONS.

Maternal Indications for the Induction of Abortion.—

Diseased Conditions associated with Pregnancy. (1) Among the various diseases which are at times associated with pregnancy and which may demand its termination are cardiac and pulmonary disease, nephritis and pyelitis, leukæmia, pernicious anæmia, Graves' disease, diabetes, chorea, and insanity.

(2) Such obstruction in the parturient canal that the birth of a viable child is impossible, as, for instance, marked degrees of pelvic deformity, fibroid tumours of the uterus, ovarian tumours, cancer of the cervix, tumours and atresia of the vagina. In many of these cases the induction of abortion would obviously not be the best treatment, but the patient may refuse to submit to any other.

Diseased Conditions due to Pregnancy.—(1) The toxæmias of pregnancy such as pernicious vomiting, jaundice, and rarely albuminuria.

(2) Malpositions of the uterus, such as incarcerated retroverted uterus and prolapse.

(3) Diseased conditions of the ovum, such as sepsis, carneous and hydatidiform moles, hydramnios, serious hæmorrhage from the uterus, and dead fœtus. When considering the induction of abortion each case must be judged on its merits. No attempt is here made to discuss the pros and cons. in any particular instance. In some cases the best treatment would obviously be to let the pregnancy go to term and then to perform a Cæsarean section or Cæsarean hysterectomy, but every patient will not consent to such a procedure.

The practitioner should for obvious reasons be most careful never to induce abortion in a patient without first having a consultation with another doctor.

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Maternal Indications for the Induction of Premature Labour.

— *Diseased Conditions associated with Pregnancy.* — The various diseases mentioned under “induction of abortion” may not endanger the mother’s life until after the child is viable.

Diseased Conditions due to Pregnancy.—(1) The toxæmias of pregnancy already mentioned, especially albuminuria which ensues nearly always after the twenty-eighth week, and eclampsia.

(2) Accidental and unavoidable hæmorrhage.

(3) Diseased conditions of the ovum such as rare cases of hydatidiform mole with a living fœtus, hydramnios, and dead fœtus.

Fœtal Indications for the Induction of Premature Labour.—

(1) Contracted pelvis; (2) Large fœtus; (3) Habitual death of the fœtus before term; (4) Prolongation of pregnancy beyond full term.

Contracted Pelvis.—As the result of experience the following table is generally accepted as a working basis for the induction of premature labour in cases of flattened pelvis.

Size of true conjugate.							
2½ inches	.	.	.	Labour to be induced at 28th week.			
3	”	.	.	”	”	”	30th
3	”	.	.	”	”	”	32nd
3½	”	.	.	”	”	”	36th

If the pelvis is “generally contracted” labour must be induced earlier, therefore increase the true conjugate by a quarter of an inch in the above table.

Such a table, however, is only a rough means of estimation, since the exact period of pregnancy cannot be diagnosed and also the size of the fœtal head has to be taken into account.

Having decided about the time at which labour should be induced, the patient must be directed to present herself at least a fortnight prior to this in order that the relative size of the fœtal head and maternal pelvis may be estimated.

(1) If the head cannot be pressed into the brim of the pelvis, labour should be induced at once; a better treatment would obviously be Cæsarean section.

(2) If the head passes into the brim with difficulty, labour should be induced at once.

(3) If the head can be pressed easily into the pelvic cavity, the induction may be postponed and the patient examined weekly till such time as the practitioner thinks fit to induce labour.

The best method of estimating the relative sizes of the foetal head and maternal pelvis is that of Munro Kerr, as follows : The patient lies on her back and her abdomen is bared : the practitioner standing on her left side and facing her, passes two fingers of his left hand into the vagina and places the thumb of this hand above the pubes so that its point touches the head. At the same time the head is seized with the right hand and pressed down into the pelvic brim. By this manœuvre the consistency of the foetal head and the degree of engagement can be determined by the internal fingers and the degree of overlapping can be determined by the thumb. It may be necessary to give the patient an anæsthetic to carry out this manipulation satisfactorily.

In cases of contracted pelvis, the object of inducing labour should be the delivery of a child that has every prospect of surviving; this being so, the operation has marked limitations.

For pelves with a true conjugate up to $3\frac{1}{4}$ inches

Bar reports a foetal mortality of 53·3 per cent.

Pinard	„	„	„	33·3	„
Krönig	„	„	„	57·4	„
Leopold	„	„	„	57·0	„
Munro Kerr	„	„	„	44·0	„

These figures show that the induction of premature labour in pelves with a true conjugate under $3\frac{1}{4}$ inches with the object of delivering a child that will live is hardly justified. For all practical purposes, therefore, induction of premature labour in cases of contracted pelvis should be limited to those in which the true conjugate measures between $3\frac{1}{4}$ inches and $3\frac{1}{2}$ inches, or if the period of pregnancy is reckoned, it is found that before the 34th week and more especially before the 32nd week the chances of the child's surviving its birth any length of time are remote.

With true conjugates above $3\frac{1}{2}$ inches, it is better, especially in a first pregnancy, to let the patient go to term, since the foetal mortality is less under these conditions, for it must be remembered that many labours terminate normally with true conjugates between $3\frac{1}{2}$ and $4\frac{1}{4}$ inches, and that premature labour has particular disadvantages of its own, apart from the mere pelvic contraction.

In dealing with the foregoing figures it must of course be understood that the great object of the induction of premature labour in cases of contracted pelvis is to obtain a child that can be reared. In the majority of patients with true conjugates below $3\frac{1}{4}$ inches, the

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child will be born alive, but most of them will either die soon after or will not survive their birth longer than a year.

Large Fœtus.—Although it is impossible to accurately determine the size of the fœtus *in utero*, it has already been pointed out that this factor is one of great importance in determining the exact time at which premature labour should be induced. The practitioner, however, may be able to gain useful information from previous labours, so that with a history of difficult labour due to the large size of the fœtus and perhaps its death, induction of premature labour in a subsequent pregnancy is indicated, since the size of the fœtus tends to increase with each pregnancy.

Habitual Death of the Fœtus.—The causes of this are not well known. Syphilis is certainly one and perhaps the commonest. The fœtus dies at about the same time in each pregnancy, and its life is at times preserved by inducing premature labour a short time previously to its expected death.

Prolongation of Pregnancy beyond Full Term.—Most of these supposed cases of post-maturity are due to inaccurate calculation. A few are genuine, and in these the child is often born dead or dies suddenly in a fit soon after delivery. When a practitioner is satisfied that pregnancy has progressed beyond its normal limits, he should induce premature labour.

METHODS OF INDUCING ABORTION.

Abortion may be induced by rupturing the membranes, dilating the cervix, or by vaginal Cæsarean section.

Rupturing the Membranes.—If there is a purulent discharge from the genital passages, this method is contra-indicated. The patient is carefully prepared as follows. For as long as possible beforehand a vaginal douche of biniodide of mercury (1 in 4,000) should be given twice daily, and a douche should likewise be given just before the operation. The vulva should be shaved and made as aseptic as possible. The instruments required, a Sim's speculum and uterine sound, should be boiled, and the operator should wear boiled indiarubber gloves.

It is best to place the patient in the lithotomy position, and if she is under an anæsthetic there is no difficulty in doing this; an anæsthetic, however, is not absolutely necessary, and in its absence the patient may object to the lithotomy position, in which case she should be placed in the Sim's semi-prone position.

Sim's speculum having been inserted so as to disclose the cervix, the sound is passed straight into the uterine cavity and the membranes are ruptured, after which the vagina is tightly plugged and a

T-bandage is applied. The plugging must not be left in longer than twenty-four hours. It is better to remove it in twelve hours, giving a douche and replugging if necessary. This method is more useful for inducing abortion in the earlier months.

Dilatation of the Cervix.—The methods of preparing the patient for this operation and of dilating the cervix will be described elsewhere, and any special points in the treatment of the diseases demanding induction of abortion by this method will be found under the appropriate headings. The cervix having been dilated, the contents of the uterus are removed with the fingers and ovum forceps. In the middle months of pregnancy before the child is viable, as for instance in the fourth, fifth, or sixth months, it may be very difficult to quickly evacuate the uterus by the method just described. The head of the fœtus at times becomes detached from its body, and the greatest difficulty may be experienced in delivering it, but this can generally be accomplished in the end by means of ovum forceps.

Vaginal Cæsarean Section.—If the head has been separated and it is necessary to deliver the patient at once, vaginal Cæsarean section may be employed to extract it. Rarely this operation may be indicated under other circumstances, but I do not think it a good one for patients over six months pregnant. It requires trained assistants.

METHODS OF INDUCING PREMATURE LABOUR.

Many methods have been devised from time to time for inducing premature labour. Their discussion here would serve no useful purpose, and I will therefore deal only with those that have been found to have a place in modern obstetrics, viz., rupture of the membranes, insertion of a gum-elastic bougie, dilatation of the cervix, and vaginal Cæsarean section.

(1) **GENTLE METHODS OF INDUCING PREMATURE LABOUR.**—**Rupture of the Membranes.**—This method is indicated in cases of eclampsia and hydramnios, and may be indicated in certain cases of accidental and unavoidable hæmorrhage. As a routine method it is unsatisfactory, since it does away with the bag of membranes and increases the risk to the fœtus. Its method of performance has already been described under "the induction of abortion," but the vagina in this case should not be plugged.

Insertion of a Gum-Elastic Bougie.—This method is by far the best when premature labour is being induced in the interests of the child, since the result more nearly approximates that of normal labour than in any other method. It should not be used if there is

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a purulent vaginal discharge from the genital passages. There are three drawbacks associated with this method; it is at times very slow in action; the membranes may be ruptured during the insertion of the bougie; and the placenta may be partly separated.

The duration of labour in such cases varies within wide limits, since with some patients as many as six days may elapse before the child is born, whilst with others it may be only a matter of a few hours. The average time is somewhere between fifty-five and eighty hours, according to the number of bougies inserted and whether labour is assisted when the cervix is dilated by forceps or version.

The patient is carefully prepared as for dilatation of the cervix, the vaginal douches being given for at least two days before the time selected for the operation which is best about 9 o'clock in the morning, for then labour will usually be terminated on the next day but one. The bougies are rendered aseptic by placing them in biniodide of mercury (1 in 1,000) for twelve hours; the solution should be cold, so that in the summer it is useful to surround the basin containing it with a little ice. If the bougies become at all warm, they bend, and great difficulty may be experienced in inserting them, and it may even be impossible; the temperature of the vagina will soften a bougie, if it is kept too long in this passage.

The operation is most easily performed under an anæsthetic, and this method will be described first.

With an Anæsthetic.—The patient having been anæsthetised and placed in the lithotomy position, a Sim's speculum is inserted, and the cervix is gently seized with a ovum forceps, which is not so likely to tear it as a volsellum: a tear of the cervix in these cases often results in rather troublesome hæmorrhage.

One, two, three, and, if possible, four bougies are then passed through the external os up the cervical canal, and their ends are pushed with the index finger right up into the uterus, so that they rest above the level of the internal os.

In most cases in which this method is indicated, the operator will be able to push his index finger up through the cervical canal; if he cannot, the cervical canal should be gently dilated with a few metal dilators. After the bougies have been inserted, the vagina is packed with tampons. If labour has not started in twenty-four hours, the tampons should be removed, the vagina douched, and if any of the bougies are found to have come down, these should be removed and new ones inserted. If none have come others can be inserted, and under such conditions I have had as many as five

bougies in the uterus before labour started. If in another twenty-four hours labour has not started, it is best to terminate the pregnancy by means of a de Ribes' bag, although if proper precautions are taken, the bougies may be left *in situ* for several days without any danger.

Complications during the Introduction.—The membranes may be ruptured during the passage of the bougie; this can best be obviated by only using very little force; it is better to let the bougie glide in whichever way it will, and not to try to push it up along the posterior wall of the uterus, although, as a rule, this is the direction it takes. If the membranes are ruptured, it is best to finish the induction by inserting a de Ribes' bag.

The placenta may be separated and serious bleeding result. As a rule, the placenta is sufficiently firmly attached to act as a buffer to the bougie, and when one can feel some obstruction to its passage, one withdraws the bougie and tries some other direction. It is rare for the placenta to be separated. In one case in which this happened, the hæmorrhage was very smart for a short time, but when I ruptured the membranes, it ceased, and the premature labour terminated satisfactorily.

Without an Anæsthetic.—If for some reason it is impossible or inadvisable to give an anæsthetic, the bougies may be introduced without its assistance. It is a rather more difficult method for one not very accustomed to performing the operation, but there is usually no particular difficulty, and, personally, in most cases I have dispensed with the aid of chloroform.

The most comfortable method for the patient is to place her in the left lateral position, and then with the right index finger at the external os the bougie is guided with the left hand through the cervical canal.

If the operator is inexperienced and the patient very tolerant, the cervix may, as already described, be seized with the aid of the ovum forceps and a Sim's speculum preparatory to introducing the bougie.

Dilatation of the Cervix.—The cervix is best dilated by means of a de Ribes' bag, and as long as no traction is made upon the bag, this method may rightly be included under the "gentle" method of dilatation.

De Ribes' bag is made of silk coated with india-rubber. It is pear-shaped, and has a curve corresponding with that of the axis of the genital canal. It is made in two sizes, a large size $4\frac{1}{2}$ inches in diameter at its upper and broadest point, which is better used at or about full term, and a smaller size $3\frac{1}{2}$ inches

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in diameter, which is the best size for inducing premature labour. To pass the bag easily the cervical canal should be large enough to admit two fingers. If the cervix is dilatable, the bag can usually be introduced through a canal somewhat smaller than this.

Advantages of de Ribes' Bag.—The method of delivery induced by de Ribes' bag approaches very nearly that of the normal; it is therefore a good method when the interests of the child are under consideration, for until the bag is expelled pressure on the child is prevented, and when it is expelled the cervical canal is large enough to allow of immediate delivery. When used for placenta prævia, it has the additional advantage of pressing on the separated placenta and so controlling the hæmorrhage.

Disadvantages of de Ribes' Bag.—1. When compared with some of the more forcible methods of inducing premature labour, de Ribes' bag is slow, but if traction is applied to the bag, the length of time occupied in dilating the cervical canal is very materially shortened.

2. The bag may burst, but if it has been properly prepared and filled with a sterilised solution this will not increase the risk to the patient.

3. It is an uncertain instrument, being, apart from its liability to burst, very likely to leak, and as a matter of fact the bag does not last very long. It should therefore always be tested before being used.

4. The bag may displace the presenting part. This is not such a serious drawback as might be supposed, since, with full dilatation of the cervical canal, any malposition can be rectified on expulsion of the bag.

5. The bag has ruptured the lower segment of the uterus. This is, of course, a very serious complication, and did it occur comparatively often this fact would contra-indicate its further use. It is, however, a very rare complication, and has occurred generally in cases of placenta prævia, when the lower uterine segment is more liable to rupture.

The bag is made sterile by boiling for a few minutes, or better still by insertion in 1 in 20 carbolic for some hours, as boiling tends to injure it. Sterilised water should be used to expand it, and its capacity is best tested by filling it with the sterilised water, and then pouring the water back into a sterilised vessel, when the correct quantity is at hand and can be used after the bag has been introduced.

It is easier to pass de Ribes' bag when the patient is under the

influence of an anæsthetic, though this can be dispensed with in many cases if the patient is at all tolerant. The patient is prepared as for dilatation of the cervix. The cervix is steadied if possible with an ovum forceps, but if the uterus cannot be held sufficiently firmly with this instrument, a volsellum must be used. The bag rolled up is introduced by means of a special pair of forceps sold with it. When the bulk of the bag has been carried past the internal os, the blades of the forceps are "sprung" but not removed and a little of the sterilised water is now run in by means of an irrigating apparatus or syringe. After a few ounces have been introduced the blades of the forceps can be removed. By leaving the blades of the forceps *in situ* whilst the first few ounces of water are being run in, the bag will be prevented from slipping through the cervical canal into the vagina, a troublesome complication which is apt to occur if the forceps are removed before any water is introduced. The remainder of the water is then run in, the tap is turned, and the india-rubber tube bent on itself and tied with a piece of tape. This prevents leakage at the tap when the pressure of the fluid in the bag is raised by the uterine pains, a likely result even with a new bag, and it will also prevent the water running out if the tap is accidentally turned whilst the bag is in the uterus. The position of the bag should be examined from time to time.

The Position of de Ribes' Bag when in the Uterus.—The bag can be made to occupy one of two positions, either between the membranes and the uterine wall, in which case the membranes are not ruptured, or inside the amniotic cavity in which case the membranes are ruptured as the bag is introduced.

Which of these two positions the bag should occupy depends upon what the bag is being used for.

If it is being used to arrest bleeding in cases of placenta prævia, the bag should be passed through the membranes into the amniotic cavity, otherwise, by the time the bag is fully distended and before the pressure is applied to the placenta an additional and unnecessary amount of placenta will have been detached.

In all other cases the bag is best used by passing it between the membranes and the uterine wall.

When the bag is expelled into the vagina, the water is run off, the bag removed and the labour terminated in whichever way may be deemed the best.

(2) **FORCIBLE METHODS OF DELIVERY.**—The "forcible" methods of delivery are dilatation of the cervix and vaginal Cæsarean section.

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Indications.—Forcible delivery of the fœtus, or “accouchement forcé” as it is sometimes termed, consists in dilating the cervix quickly and delivering the child by forceps, version, or craniotomy as the case may be. The occasions on which such treatment may be necessary must be very few, but such as they are they are concerned with the preservation of the mother's life rather than that of the child, since most of the diseases for which forcible delivery is undertaken are in themselves so dangerous to the life of the child, that it is nearly certain to be dead, or to quickly succumb, apart from the fact that the child may be killed during the extraction.

Forcible delivery is practised rarely in eclampsia, accidental hæmorrhage, unavoidable hæmorrhage, and any other condition in which the mother's life is in immediate danger and the cervix is not dilated sufficiently to deliver by forceps, version, or craniotomy. As to the propriety of forcibly delivering the child in eclampsia and ante-partum hæmorrhage, the reader is referred to the sections dealing with these subjects; as a method of treatment it is not ideal.

Dilatation of the Cervix.—The cervix can be quickly dilated to a diameter of $4\frac{1}{2}$ inches by de Ribes' bag, the fingers, or expanding metal dilators.

De Ribes' Bag.—The method of using this bag has already been described and when rapid delivery is the object desired, the bag is inserted into the uterus, filled, a string is then tied to the tube, carried over the end of the bedstead and attached to a two-pound weight. By this means the cervical canal can be dilated in a few hours, the time varying with the condition of the cervix and according to whether labour has commenced or not.

Digital Dilatation.—This is rather a fatiguing method since it will often take well over the hour to accomplish.

As a method of dilatation it has the advantage that the operator can estimate more accurately what is taking place than he can with the other methods of forcible dilatation. In some cases also it is found impossible to insert de Ribes' bag on account of strong uterine contractions or because the membranes having ruptured the head is driven down and cannot be pushed out of the way.

With the patient anæsthetised and properly prepared, the operator passes the index finger of his right hand if the patient is on her back, or left hand if she is on her left side, gently up the cervical canal. If the external os is not large enough to admit the finger, it must first be dilated with a few sizes of ordinary metal dilators. When the index finger has been passed into the uterus,

it is withdrawn and re-inserted, this time with the thumb; the internal os is then enlarged by a movement somewhat corresponding to that of "rolling" a cigarette, and as the canal enlarges, the second finger is introduced by the side of the others, and a similar movement carried out and so on until the thumb and all the fingers have been introduced, and when these are separated the os will be fully dilated (Harris). The cervical canal can be digitally dilated by another method (Bonnaire) in which the index finger of each hand is inserted through the os and forcibly abducted, and when the canal is large enough two fingers of each hand are inserted and the cervical canal further stretched.

The strictest antiseptic precautions should be taken with this method, and the operator should wear sterilised rubber gloves. The stretching must be done carefully, for there is a danger of the cervix and lower uterine segment being torn.

Dilatation with Expanding Metal Dilators.—There are various patterns of expanding metal dilators on the market, the two best known are Bossi's and De Seigneux's; they differ principally in the fact that whereas Bossi's instrument dilates the cervical canal in a horizontal plane and so increases the risk of lacerating the posterior wall of the cervix with its posterior blade, a complication common with this variety of instrument, De Seigneux's instrument dilates the canal in an oblique plane and so obviates this risk.

The method of using both of these instruments is the same. With the patient under an anæsthetic and in the lithotomy position, the instrument is passed with all antiseptic precautions through the external os and its handle is depressed against the perineum.

The cervical canal is then dilated very gradually by turning the handle of the instrument in the intervals between the pains about 1 centimètre every four minutes, and as the instrument dilates to 10 centimètres or so (4 inches) it takes about forty minutes to fully dilate the cervix, the operator being guided as to how long he should take by the condition of the cervix which must be palpated with the index finger to see that it is not too tense. Directly the canal is large enough to take the ends of the blades covered with their metal caps, the instrument should be withdrawn and the caps applied since they make the ends of the blades much broader and therefore less likely to lacerate the cervix.

By means of such an instrument the cervix can be dilated more rapidly than by any other method, the time varying with different individuals, whether labour has started or not, whether the

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patient is a primigravida or a multigravida, and whether the cervical canal is obliterated or not.

Dangers.—This method of dilating the cervix is not much in vogue, partly because it demands a special instrument which will but rarely be required, and partly because of the danger of laceration associated with its use. This danger of severely lacerating the cervix is a very real one, but can be guarded against to a certain extent as follows :

- (1) The dilatation should be carried out very slowly.
- (2) The handle should never be turned during a pain.
- (3) Care must be taken to prevent the ends of the blades slipping out of the cervical canal.

- (4) The instrument is best used only during labour and when the cervical canal is obliterated, so that there is only the external os to dilate. If it is used before the cervical canal is obliterated, the risk of laceration will be greatly enhanced, and the operator must be certain that the ends of the blades project well above the internal os.

Vaginal Cæsarean Section.—In this operation the cervix and a little of the lower uterine segment are divided, by which means the uterus can be emptied in a few minutes.

This operation has not been received with much favour in this country, perhaps because the opportunities warranting its performance are so few and far between that but few operators have had sufficient cases upon which to form any reliable conclusions. Munro Kerr who has had some experience thinks highly of the operation when performed during the first five or six months of pregnancy but not later. Duhasen, who invented the operation reports 201 cases with 28 deaths (13·9 per cent.), fifteen of the patients who died having severe eclampsia; of the thirteen remaining the death of ten was stated to be from causes other than the operation.

Vaginal Cæsarean section as a means of inducing premature labour has been used in cases of eclampsia, accidental hæmorrhage, carcinoma of the cervix and rigidity of the cervix, when expanding metal dilators were not available, were not indicated, or could not be used.

Shortly described the operation is performed as follows :

The patient is thoroughly prepared as for any other vaginal operation, anæsthetised, placed in the lithotomy position, and the bladder is carefully emptied. Auvard's speculum is now inserted and the cervix is pulled down to the vulva by means of two pairs of volsellum forceps applied one on each side. The anterior

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vaginal wall covering the cervix is then divided by a horizontal incision, and from the centre of this a longitudinal incision is carried one up to within one inch of the urinary meatus. The vaginal membrane is now reflected by the finger and the bladder is pushed well out of the way. The cervix and a little of the lower uterine segment are next divided in the middle line with scissors from below upwards, one blade being introduced into the cervical canal for that purpose.

During the incision of the cervix, traction is made on the volsella so that the cervix is gradually pulled lower down and the wound thus kept well within view. The membranes are ruptured when they present, after which the child is delivered by traction on a foot or forceps. At the end of the third stage, the cervix is pulled down and carefully sutured with catgut sutures, after which the vaginal wall is united similarly.

Difficulties.—The operation is rendered difficult by a small vagina such as may be found in a primigravida. In this case it may be necessary to make a deep perineal incision through the vagina and levator ani, by which the size of the vagina will be much increased.

If the operation is performed towards the end of pregnancy it may be necessary in order to obtain enough room to deliver the child to divide the posterior cervical and vaginal walls, as well as the anterior cervical wall.

Vaginal Cæsarean section is an operation that should only be performed when the help of trained assistants is available and the surroundings are such as to reduce the risk of sepsis to a minimum.

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PUBIOTOMY.

THIS operation is better designated as Hebotomy or Hebosteotomy. It resembles symphysiotomy in its general features and in the

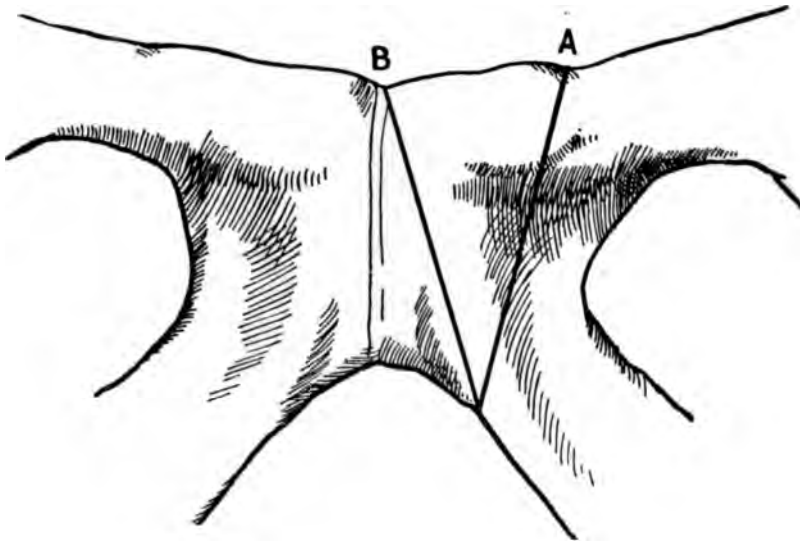


FIG. 1.—The symphysis pubis from the front. (Munro Kerr.) The lines A and B. represent the directions in which the pubes may be divided in the operation of pubiotomy. A. Van de Velde's incision. B. Gigli's incision.

indications for its performance, and much that is contained in the article on Symphysiotomy (*q.v.*) applies to this operation.

It was first described by Stolz in 1844 as an alternative to symphysiotomy, the pubic bone being divided instead of the symphysis in order to secure enlargement of the pelvis.

Of late, Döderlein, Gigli, Bonardi, Van de Velde, Sellheim, and others have written largely on the subject.

Supporters of the operation claim that there is less risk of injuring the bladder and urethra, that it is easier to perform than symphysiotomy, and that the pelvis is permanently enlarged. The union is said to be bony and not fibrous.

The risks of hæmorrhage seem to be much the same as in symphysiotomy, and very serious bleeding has occurred from injury to the corpus cavernosum, with the subsequent formation of a hæmatoma.

The Operation. — Döderlein makes an incision 2 to 3 centimètres long over the pubic spine on one side, avoiding the external inguinal ring. The finger is next introduced behind the pubic bone, and the bladder separated and pushed aside. A special hooked carrier is passed behind the symphysis in close contact with the bone, and is made to emerge below the pubic arch, piercing the skin outside the labium majus. A Gigli's saw is hooked on, and the carrier withdrawn. The bone is then divided from behind forwards, care being taken to avoid the corpus cavernosum and the internal pudic vessels. The former should be pushed aside, for if wounded very troublesome bleeding may occur. Hæmorrhage also results, if the veins in the subcutaneous cellular tissue or behind the symphysis are wounded.

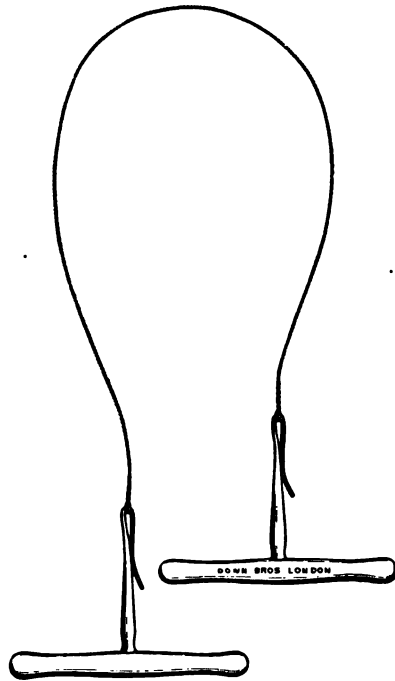


FIG. 2.—Gigli's saw and handler.

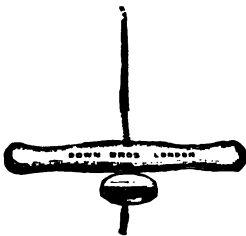


FIG. 3. — Handle and method of fixing Gigli's saw.

The operation is better performed *subcutaneously*; an incision is made above and internal to the pubic spine and a special curved pubiotomy needle is passed behind the bone and made to emerge below the pubic arch by piercing the soft tissues. The needle is then threaded with silk, and with this a Gigli's saw is drawn up out of the upper incision and the bone divided subcutaneously. Great care must be used not to cut through the tissues too quickly. Bumm passes the needle from below upwards as in Fig. 12.

The child is either delivered by forceps, or parturition is allowed to go on naturally. As is pointed out in the article on

Symphysiotomy, very severe lacerations of the soft parts may occur during the extraction with forceps. This is especially

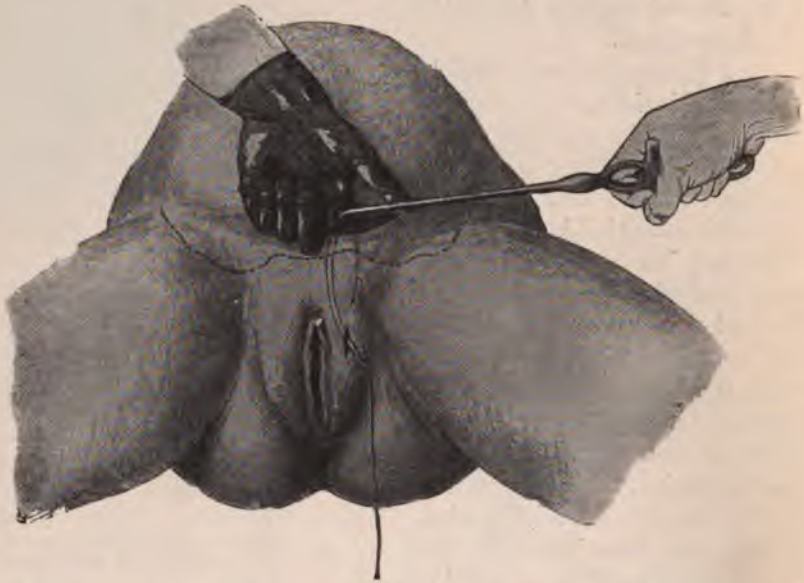


FIG. 4.—Pubiotomy after the method recommended by Döderlein. (Munro Kerr.)

likely to occur in a first labour, and in such cases time should be given for the parts to dilate naturally if possible.

The small openings in the skin made by the subcutaneous method are easily closed with stitches and a dressing applied. The pelvis, as in symphysiotomy, should be supported with a firm girdle or strapping, and the patient is kept in bed for three weeks or a month.



FIG. 5.—Handled blunt needle carrier for Gigli's saw.

Results.—At present it is difficult to judge of the merits of this operation,

but the arguments against it hold exactly as in symphysiotomy (*q.v.*). Pubiotomy seems to be somewhat safer than symphysiotomy.

Krönig had a mortality of two out of twenty-three cases, and

Döderlein by the open method reports a maternal mortality of 10·4 per cent., and with the subcutaneous 4·1 per cent.

Infected cases, as in symphysiotomy, are not suitable for pubiotomy. It should not be performed in primigravidæ.

Leopold gives sixty cases with no maternal mortality and four



FIG. 6.—Needle carrier for Gigli's saw.

fœtal deaths, and Bumm fifty-three cases with only one maternal death.

Whitridge Williams states that two patients died out of 141 cases operated on in the clinics of Berlin, Bonn, Dresden and Prague.



FIG. 7.—Bumm's subcutaneous method of performing pubiotomy, the needle being introduced from below upwards under guidance of the finger in the vagina. (Blacker.)

These were reported at the German Gynæcological Society in 1907.

In Döderlein's cases 6·6 per cent. of the children were born dead; but, as Blacker points out, in all these cases forceps had been used beforehand.

Hammerschlag, quoted by Munro Kerr, gives the results of

pubiotomy in Germany up to 1910. In seventy-seven cases operated upon by the open method the mortality was 10·4 per cent., while in 700 cases operated on by the subcutaneous method (Bumm and Döderlein) it was 4·4 per cent. The foetal mortality was 9 per cent.

A modification of pubiotomy is performed by Pinard and Farabœuf, in which the pelvic division is still more lateral, the pubes and ischium being divided. It is termed ischio-pubiotomy.



FIG. 8.—Gigli's saw in position for cutting through the bones in pubiotomy: Bumm's method. (Blacker.)

The incision through the bones is made 4 centimetres away from the middle line. The indications, limits and dangers are the same as in pubiotomy or symphysiotomy.

It has yet to be shown what are the special advantages of these operations over Cæsarean section or craniotomy, and further, whether any of them are suitable for the emergencies of general practice.

C. HUBERT ROBERTS.

SPONDYLOTOMY.

(1) THE spine is divided where it most projects with a pair of strong scissors. This will probably take some time.

(2) After division of the trunk, the lower half is first delivered by traction on the legs, then the upper half by traction on the arm. If delivery cannot be effected in this way, the cephalotribe or cranioclast must be applied to each half.

Dangers.—The soft parts of the mother may be injured during the operation of evisceration and spondylotomy, and septic organisms may be introduced.

COMYNS BERKELEY.

SYMPHYSIOTOMY.

THIS operation was first suggested by Claude de la Courvée in 1655. Sigault and Le Roy performed the same operation in 1777, but its results were unsatisfactory as a urinary fistula remained. Later it was attempted by other operators, but owing to want of aseptic technique it fell into disuse, Baudelocque being violently opposed to it in France.

The operation was revived in 1866 by Morisani in Italy, and was practised by Spinelli, Varnier, Zweifel and Pinard on the Continent, and by Harris in America in 1892.

Important discussions took place on this subject at the German Medical Congress in 1893, the International Medical Congress in 1897, and the Obstetrical Society of France in 1899. Quite lately cases have been reported by Gigli and Van de Velde, and in this country by Herman, Buist, Munro Kerr, Blacker, and others; but up to the present time among English obstetricians the operation has not been looked upon with much favour.

Objects of the Operation.—By symphysiotomy the bony pelvis is enlarged so that a living child can be born at term *per vias naturales* without great difficulty.

It is not an operation for malpresentation or for malposition of the child, and is suitable only for slight degrees of pelvic contraction where forceps have failed, as an alternative to Cæsarean section or craniotomy.

Results of Division of the Symphysis.—This causes a divarication of the bones not only outwards but downwards, as pointed out by Munro Kerr, who finds that with 3 centimètres of pubic separation there is a corresponding descent of $\frac{1}{2}$ centimètre.

Regarding the actual separation of the pubic bones, Sandstein and Morisani maintain that with 6 centimetres divarication there is a gain of 1 centimètre in the conjugata vera, and Pinard states that with the same separation (6 centimetres) the total gain by the projection of the head through the gap is 22 millimètres or $\frac{7}{8}$ inch. Much must depend upon whether observations are taken upon normal or contracted pelves. Sandstein's cases appear to have been normal ones. The circumferential measurements are probably proportionately increased also, and as has been pointed out, the

separation allows bulging of the anterior parietal bone through the gap during actual delivery. Biermer, quoted by Blacker, finds that, by experiments on puerperal pelves, separation of the pelvic bones to distances varying from 7 to 9 centimètres causes luxation of the sacro-iliac joints. Damage to these joints has resulted in permanent lameness, though this is not common.

It would thus appear that separation of the pubic bones to the extent of $2\frac{1}{2}$ inches increases the conjugate of the brim by about one-third of an inch.

Limits of the Operation.—According to Munro Kerr, the following conditions are necessary for success, and these will be

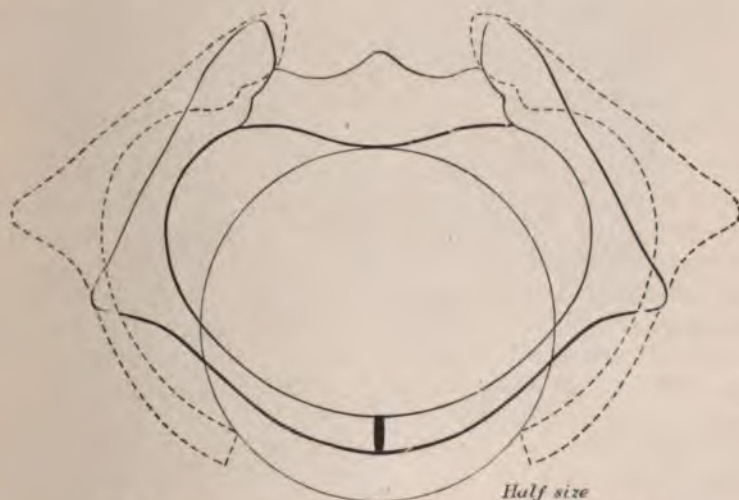


FIG. 1.—Separation of bones in symphysiotomy. (Blacker.)

considered in detail: (1) The child must be alive and at term; (2) The pelvis must not be greatly deformed; (3) The genital passages must be dilated or dilatable; (4) The patient must be free from infection.

(1) *The Child must be Alive and at Term.*—This is very important, for if the child is dead or unlikely to live, symphysiotomy is out of the question. To perform symphysiotomy and lose the child is exposing the mother to unnecessary risk. In such cases craniotomy or Cæsarean section should be performed. In English obstetric practice it is still the custom to perforate a living child in certain cases, horrible as this may be, rather than subject the mother to grave risk of her life. Symphysiotomy, followed by craniotomy, is bad practice, nor should it be combined with

induction of premature labour, for in such cases the chance of survival of the child is, or may be, small.

(2) *The Pelvis must not be Greatly Deformed.*—Symphysiotomy is not an operation for severe forms of pelvic contraction. Most operators place the limit at 3-inch conjugata vera, but even with pelves above this the disproportion between the fœtal head and the pelvis must always be taken into consideration. If the disproportion is great, it is better to perform Cæsarean section or craniotomy.

As already pointed out, it is not an operation for mere malposition or malpresentation, for these can be rectified by other means. Herman says that symphysiotomy may be done with a pelvis larger than $3\frac{1}{4}$ inches, when with the os uteri fully dilated the head will not enter the brim, and cannot be pulled into it with forceps, if the reason is simply the size and hardness of the fœtal head, and if the equator of the head exceeds the diameter engaged in the brim by less than $\frac{1}{2}$ inch.

It is probable that symphysiotomy is best performed in the second stage of labour, and with the cervix fully dilated. The separation of the bones should never exceed $2\frac{1}{2}$ inches. Possibly the operation gives better results with general contraction of the pelvis than with mere flattening, as in the former case a gain results in the transverse diameter, which is a most important factor. The diameters of the outlet are not markedly increased by symphysiotomy.

(3) *The Genital Passages should be Dilated.*—As already mentioned above, the cervix should be fully dilated or dilatable in order that forceps can be applied to effect delivery after division of the symphysis. It is also important that the genital canal, and especially the vaginal orifice, should be relaxed. Some operators even dilate the vagina with bags, beforehand, for statistics show that after division of the symphysis, most of the serious lacerations take place in the roof of the vagina *during the extraction of the child*. Therefore the operation has yielded better results in multiparæ in whom the passages have already been stretched by previous deliveries.

(4) *The Patient must be Free from Infection.*—The risks of infection add seriously to the dangers of symphysiotomy, as cellular spaces are opened up and grave complications may ensue. With pubiotomy this must be evident, for by the open method the condition is comparable to a compound fracture.

Anatomy.—The parts injured, or liable to injury, in symphysiotomy or pubiotomy must be carefully considered. As a rule, the joint between the pubic bones consists of a

fibro-cartilage lined with a synovial membrane. The cartilage is very closely adherent to the pubic bones by "a series of nipple-like projections; these may catch the knife of the unskilled operator and lead to the supposition that there is bony ankylosis" (Munro Kerr). The ligaments of the symphysis (superior, inferior,



FIG. 2.—Deep dissection of female perineum, showing structures liable to injury in the operation of symphysiotomy and pubiotomy (Munro Kerr).—(a) crus clitoridis; (b) clitoris; (c) suspensory ligament of clitoris; (d) meatus urinarius; (e) artery to clitoris; (f) artery to crus clitoridis; (g) left crus divided and retracted to show f; (h) internal pudic artery; (i) vagina; (l) sphincter vaginae; (m) levator ani; (n) anus; (o) sphincter ani; (p) border of gluteus maximus; (q) artery to bulb; (r) internal pudic artery; (s) ischium.

anterior, and posterior) are very definite fibrous investments, of which the inferior (ligamentum arcuatum) is the most important. The latter is in relation with the triangular ligament, the dorsal vessels of the clitoris, the urethra, and neck of the bladder.

The arterial supply of this region is derived from branches of the pudic, deep epigastric and obturator vessels.

Still more important is the large venous plexus behind the

symphysis (the inferior vesical), and during the operation very serious bleeding may also occur from tearing of the bulb of the vestibule, dorsal vein of the clitoris, or from lacerations of the plexus of veins surrounding the vagina. It must be remembered that all these vessels become much enlarged during pregnancy.



FIG. 3.—Symphysis pubis from behind to show venous plexuses liable to injury in symphysiotomy and pubiotomy. (Munro Kerr.)

Laceration of the urethra and injury to the neck of the bladder is considered later.

The Operation.—Many or few instruments may be required. Those who perform the *subcutaneous* method require only a tenotomy knife and intelligent assistants. For the *open* method it is well to have ready scalpels, scissors, dissectors, dissecting forceps, pressure forceps, needles, sutures, a bladder sound, a special blunt-pointed symphysiotomy knife (Galbiati's) and Pinard's registering separator. The lithotomy position is best, and the most rigid asepsis is necessary. Assistants should be instructed

how to support the legs in order to avoid any sudden dangerous separation of the bones.

The Open Method of Performing Symphysiotomy is thus described by Farabœuf. A small incision is made over the symphysis, the



FIG. 4.—Galbiati's symphysiotomy knife.

clitoris being pulled down, and if necessary, its suspensory ligament divided: the lower border of the triangular ligament is then defined. The ends of the recti muscles are separated or divided, and the finger pushed down into the cave of Retzius between the bladder and the posterior surface of the bone.

A dissector is then introduced behind the triangular ligament from below upwards, and the symphysis divided upon it with a knife from behind forwards.

Munro Kerr, after having made an incision over the symphysis and having pushed the finger down behind the joint, divides the symphysis from before backwards and above downwards with a strong, small-bladed bistoury, keeping well to the left side.

Some operators define the urethra by a bladder sound, drawing it aside during the operation. This seems sound practice.

After division of the symphysis and triangular ligament the bones spring apart, and the child may then be delivered with forceps. In some cases the forceps will already be on the foetal head or they can easily be applied.

Some authorities, after dividing the symphysis, leave delivery to nature; this is of especial value in primigravidae in order to enable the soft parts to dilate slowly as grave lacerations have resulted during extraction by forceps. Walcher's position is also useful in difficult cases as it further increases the conjugata vera and in the absence of assistants to hold the legs is of practical value.

The amount of separation of the bones should be carefully watched, and if necessary, accurately measured by some such instrument as that used by Pinard; otherwise instructions must



FIG. 5. — Pinard's registering separator for symphysiotomy. (Blackier.)

be given to the assistants to watch the separation, especially while the child is being extracted with the forceps.

Bleeding after the delivery of the child is controlled by packing with gauze; it may be considerable and even alarming. After delivery of the placenta in the ordinary way the wound is closed with sutures, but owing to free oozing it may be wise to drain the space behind the symphysis for a few days. The bones themselves do not need wire sutures or pegging, for they can be kept in position by a pelvic girdle of strong webbing (Hastings Tweedy) or by strips of broad strapping. Care should be taken that the bladder is not nipped between the apposed bones.

All lacerations of the vagina or soft parts, especially of the urethra, should be closed at once. The patient is kept in bed for three weeks. Catheters should be avoided if possible. Most patients are allowed to walk by the end of the fourth week.

The union of the symphysis after the operation is fibrous rather than bony, and the ends of the bones can be felt to move more or less freely on rotating the thigh. This has been shown by radiograms taken afterwards. It does not appear necessarily to interfere with locomotion.

Subcutaneous Symphysiotomy.—This method is preferable to that performed by the open incision, and it needs no special instruments. Herman's description is as follows: "A sharp knife is introduced through the skin opposite the middle of the symphysis pubis; it easily penetrates the symphysis. If you do not hit the middle line and the point impinges on bone, the difference of resistance will inform you of the fact; if so, shift the point a little, the right or left, and it will come upon the symphysis. When the knife has penetrated the symphysis, cut downwards until you have reached and divided the ligamentum arcuatum. Then turn the blade so that the cutting edge is upwards, and divide the rest of the symphysis. There may be a little difficulty in dividing the last ligamentous fibres at the top and lower part of the symphysis because there is a little tendency for the knife to push these fibres before it instead of cutting quickly through them. You will overcome this tendency by pressing with the finger applied externally these fibres against the knife. When you have divided all the fibres which unite the two pubic bones, they will at once spring apart about $\frac{1}{2}$ inch; then seize the foetal head with forceps and deliver."

Zweifel performs a very similar operation, but divides the symphysis with a Gigli's saw introduced by a handled needle passed subcutaneously behind the joint.

The author prefers Ayres' method, in which a sharp tenotomy knife is introduced subcutaneously into the tissues in front of the symphysis. A blunt, probe-pointed tenotomy knife is then substituted for the sharp one, and the joint divided from above downwards, the soft parts being guarded by a finger in the vagina. The position of the urethra is defined by the bladder sound.

Results and Prognosis.—Symphysiotomy is not looked upon at present with much favour by the majority of English obstetricians, owing to the very limited field of its application. The operation in a way comes into the field with Cæsarean section and craniotomy, but it has yet to be proved that it gives better results, and, as before pointed out, symphysiotomy is only for moderate degrees of pelvic contraction, never for severe forms. In the latter cases Cæsarean section and craniotomy give better results, and when the contraction can be ascertained before full term, induction of premature labour is the best procedure. Moreover, these are simple operations.

Symphysiotomy, on the other hand, seems, in the author's opinion, to be an operation only suitable for certain cases, and only to be performed by those who have had previous experience. "You must be sure before doing symphysiotomy that you can deliver the child easily afterwards. If this is doubtful, then do craniotomy or Cæsarean section" (Herman). Symphysiotomy is unsuitable for breech cases, and should never be performed if the child is dead.

Next turning to the mortality and morbidity of the operation :

The *maternal mortality* seems to compare favourably with Cæsarean section, at all events by the subcutaneous method, that is to say, it is almost nil, but its *morbidity* is quite another matter. The Italian statistics up to 1893 give a maternal mortality of 2 per cent. and a *fœtal mortality* of 13·4 per cent., *i.e.*, maternal mortality equals Cæsarean section, but the fœtal mortality is much higher.

Munro Kerr's recent statistics give 245 cases of symphysiotomy performed by representative operators in this and other countries, with a maternal mortality of 7 per cent. and a fœtal mortality of 10 per cent.

Dangers to the Patient in Symphysiotomy.—(1) Injuries to the pubic and sacro-iliac joints; (2) hæmorrhage from lacerations; (3) lacerations of the soft parts, such as the urethra and bladder; (4) septic infection, with the risks of suppuration and necrosis of bone.

It is not exactly known what amount of separation is required to tear the ligaments of the sacro-iliac joints, though as has been pointed out above, from experiments on normal and puerperal pelvises it is inadvisable to exceed 6 centimètres.

Enthusiasts of symphysiotomy maintain that disturbances of locomotion are not common, and that although a little permanent separation of the symphysis often results, this does not necessarily give rise to any ill-effects.

Injuries to the Soft Parts.—These are much more frequent and serious, and the morbidity of symphysiotomy, therefore, is a serious factor. Lacerations of the bladder, urethra, and vestibule are not infrequent, and the hæmorrhage resulting therefrom is stated to be at times alarming and difficult to arrest.

Severe bleeding sometimes occurs as Zweifel points out after the division of the symphysis, during the extraction of the child.

Injuries to the urethra are commoner than injuries to the bladder, and in the worst cases the urethra has been torn completely across. Permanent incontinence of urine has also been recorded. Most of these accidents seem to have occurred in primigravida, and Whitridge Williams, Blacker and others point out the dangers of symphysiotomy in a first labour, and rightly maintain that it is not to be lightly undertaken.

The possibility of repeated symphysiotomy may arise, since the operation does not interfere with subsequent fertility. Some operators report unfavourably on such repetition. They have not found the pelvis to be permanently enlarged, and the dense band of union from the previous operation gives rise to trouble. Thies and others, however, hold the opposite view, and state that patients can have other children easily and without interference. These authors also say that their patients have been able to stand and walk without difficulty.

Füth has suggested a plastic bone operation for permanently enlarging the pelvic girdle, but it does not seem to be of much practical value.

C. HUBERT ROBERTS.

VERSION.

Indications.—Version may be employed in the following circumstances:

- (1) Mal-position of the child: (*a*) breech in a primigravida; (*b*) transverse; (*c*) face; (*d*) brow; (*e*) prolapse or dorsal displacement of the arm.
- (2) Ante-partum hæmorrhage: (*a*) unavoidable hæmorrhage; (*b*) accidental hæmorrhage.
- (3) Contracted pelvis: flattened variety.
- (4) Prolapse of the umbilical cord.
- (5) To hasten delivery: (*a*) in the interests of the mother; (*b*) in the interests of the child.
- (6) Double monsters: (*a*) thoracopagus; (*b*) dicephalus.
- (7) Cancer of the cervix, in an advanced stage.

Varieties.—There are two kinds of version:

Cephalic version, in which the head of the child is made to present in place of some other part of the child which is presenting.

Podalic version, in which the breech of the child is made to present.

Methods.—There are three methods of turning the child:

External version, in which the operator uses both his hands externally.

Bi-polar version, when the operator with one hand in the vagina and two fingers through the cervix turns the child with the aid of the other hand used externally.

Internal version, when the operator passes one hand through the cervix into the uterus, and uses his other hand externally.

Comparison of the Methods.—External version is the *safest*. Bi-polar version is the most *difficult*. Internal version is the easiest, but the most *dangerous*.

Difficulties.—A diminished amount of liquor amnii increases the difficulties of all the methods, as does increased frequency of the pains and rigidity of the abdominal muscles and uterus.

Dangers.—The patient may be infected during bi-polar or internal version. The uterus may be ruptured during the performance of internal version. The child may be asphyxiated during the extraction in bi-polar or internal version.

Contra-indications.—Never try to turn during a pain, as version is then impossible, and the uterus may be ruptured in the attempt. Never try to turn if the uterus is tonically contracted, or if there is a ring of Bandl, because the uterus will surely rupture.

Do not perform podalic version in a patient with a small round pelvis, since no advantage is gained thereby; in fact, as the head may have to be perforated, it is a positive disadvantage.

Version should not be attempted with a hydrocephalic child, or when the presenting part has entered the cavity of the pelvis.

Version should not be attempted in a flattened pelvis with a conjugate diameter smaller than 3 inches.

Preliminary Treatment for all Methods.—The steps to be taken with respect to the preparation of the patient and operator have already been detailed in the remarks under General Considerations. The operator should particularly remember to give a vaginal douche of 1 in 2,000 biniodide of mercury, if bi-polar or internal version is going to be performed, to lessen the danger of infection when the fingers or hands are passed into the uterine cavity.

Position of the Child.—In all methods it is of prime importance that the position of the child should be accurately determined before an attempt is made to turn it; success otherwise is impossible.

Anæsthetic.—Chloroform, which is the best form of anæsthetic to use, lessens uterine contractions, and, when given to the full degree as it should be in this operation, banishes rigidity of the abdominal muscles. Version, therefore, is much easier to perform when the patient is under the influence of an anæsthetic, and although with an expert operator its use is not as a rule absolutely necessary, yet it is most advisable to have the patient anæsthetised at any rate before internal version is attempted.

An anæsthetic must be administered when:

- (1) The patient is very intolerant of manipulation and keeps her abdominal muscles rigid;
- (2) When the pains are so rapid that the interval between them is too short to allow of the proper steps being followed;
- (3) When the introduction of the hand into the vagina causes a spasm of this structure;
- (4) When the vagina is small and there is difficulty in introducing the hand;
- (5) When the liquor amnii has drained away and the uterus is *contracted* round the child. Version in this latter case is a difficult operation, requires great judgment, and is not devoid of danger. This is referred to later under Internal Version.

CEPHALIC VERSION.

By this operation the head of the child is made to present.

Indications.—A transverse position of the child, the mother's pelvis being normal; breech presentation of the child, the mother being a primigravida.

(1) **External Cephalic Version.** — *Time for Operating.* —



FIG. 1. External version.

(a) Before labour has commenced; (b) after labour has commenced, but before the membranes have ruptured.

Position of the Patient.—On her back with her buttocks a little raised, her thighs flexed, and her abdomen uncovered.

Position of the Operator.—On one or other side of the patient, facing the foot or top of the bed, whichever he prefers.

Steps of the Operation.—(a) With one hand the operator pushes the head of the child towards the brim of the pelvis, and with the other hand he pulls the breech towards the fundus of the uterus (Fig. 1).

(b) When the head presents, it should be pushed into the brim of the pelvis, and kept there by means of an abdominal binder.

If labour has commenced, the patient should be kept on her back unless there is an abnormal lateral obliquity of the uterus, in which case the patient should lie on the side opposite to that of the uterine obliquity. The membranes should be ruptured when the os is fully dilated.

Difficulties.—These may be due to (a) Rigidity of the abdominal and uterine muscles. It is this condition which makes external cephalic version always difficult, and sometimes in a primigravida impossible. This rigidity may be overcome by placing the patient fully under an anæsthetic.

(b) A small amount of liquor amnii. If the quantity of liquor amnii is small before rupture of the membranes, or if the membranes have ruptured and the liquor amnii has escaped, it may be impossible to perform external cephalic version. An expert operator may, however, be successful when the membranes have only very recently ruptured.

(c) Fixation of the presenting part of the brim. If the breech or shoulder has sunk into the brim, external version may be impossible until one or the other has been lifted out. This difficulty may be overcome in two ways, either by the operator lifting the child up with both hands before trying to turn it, or by postural treatment of the mother. In the latter case the mother may be placed in the Trendelenburg position, as suggested by Pollock, or in the lateral position, on that side to which the head is directed.

(d) Recurrence of the misplacement. If the mal-position is discovered before term, its tendency to recur may be combated by pushing the head into the brim and applying a tight abdominal binder. If, in spite of this, the position of the child changes, external version may be again employed, and as, on account of the absence of internal manipulations, there is no danger of infection, there need be no hesitation in repeating the operation whenever necessary.

(e) Difficulty in turning. In spite of an anæsthetic the operator may find that he cannot turn the child, in which case he may be successful with the aid of an assistant, who, standing on the opposite side of the patient, will endeavour to move one end of the child whilst the operator tries to move the other.

(2) **Bi-polar Cephalic Version.**—The advantage of this method of turning is that when external version is impossible it can be carried out much earlier in labour and with less risk of sepsis than internal version.

Indication.—A transverse position of the child, the mother's pelvis being normal.

Time for Operating.—Preferably before rupture of the membranes, although bi-polar version may be successfully accomplished if the membranes have only recently ruptured.

Position of the Mother.—The mother may be placed in the left lateral position with her thighs well flexed, or she may be placed in the dorsal position. In England the lateral position is usually chosen. In any case the buttocks must be drawn down to the edge of the bed.

Position of the Operator.—If the mother is on her left side, the operator stands on her right side, passes his right fingers into the vagina, and places his left hand over the abdomen.

If the mother is on her back, the thighs must be kept flexed by assistants whilst the operator stands between them. The fingers are passed into the vagina, the palmar surfaces corresponding to the abdomen of the child.

Steps of the Operation.—(a) The operator passes the first and second fingers of his right hand through the cervix, supporting the uterus with the other hand externally.

(b) The two fingers of the internal hand, having touched the shoulder, push it towards the breech, whilst the external hand pushes the head towards the pelvic brim.

(c) When the head has been pushed over the pelvic brim, the same measures are then taken, if necessary, to keep the head in position as described in external cephalic version.

Difficulties.—(a) Those due to rigidity of the abdominal and uterine muscles and to a deficiency of liquor amnii, as mentioned under Cephalic Version.

(b) Insufficient dilatation of the os. An expert operator can perform bi-polar version with one finger through the cervix.

(c) The breech does not rise to the fundus. In such cases, after the head is placed over the os, the internal hand has to be withdrawn, and with it the breech pressed towards the fundus, whilst the other hand is keeping the head stationary.

PODALIC VERSION.

By this operation the breech of the child is made to present.

Indications.—(1) *Mal-presentations of the Child*, the mother's pelvis being normal, such as: (a) A transverse presentation, cephalic version having failed; (b) a face presentation that will not enter the brim; (c) a brow presentation when seen early in labour; (d) prolapse of the arm in face presentation, and in vertex presentations when the head is high up, and re-position and forceps have failed; (e) dorsal displacement of the arm, re-position and

forceps having failed; (*f*) in certain cases of prolapse of the umbilical cord, the child being alive, when manual or instrumental re-position has failed and the os is not sufficiently dilated to allow of immediate delivery with forceps, podalic version is advocated by many authorities; but the treatment in most cases will prove disappointing, on account of the delay in delivery of the head due to the cervix not being sufficiently dilated. If, in addition to the prolapse of the cord, there is a face presenting above the brim and re-position has failed, podalic version is indicated.

(2) *Flattened pelvis*, with a conjugate of not less than 8 inches and no other contraction. (*a*) Under the above conditions the foetal mortality is higher than when forceps are used, so that as a routine practice it is not advisable; (*b*) if on examination the head is entering the brim and there appears to be more room on one side of the sacrum than the other (scolio-rachitic pelvis), and the occiput is not directed to that side, podalic version is indicated, the right leg of the child being brought down if there is more room on the right side of the pelvis, and *vice versa*; (*c*) posterior parietal presentation: in such presentations it will be found that the forceps are of little use, and unless the head is fixed, podalic version is the best treatment; (*d*) placenta prævia, there being no contra-indication to version present.

(3) *Ante-partum hæmorrhage*.—(*a*) Unavoidable hæmorrhage: the only drawback to podalic version in cases of placenta prævia is that the foetal mortality is so high, on an average at least 50 per cent.; otherwise it is a safe and efficient treatment and the most easy of application, since treatment by de Ribes' bag, which is probably the best method because of the lowered foetal mortality attending its use, necessitates the possession of this article and special forceps to introduce it; (*b*) accidental hæmorrhage: when, in this complication, plugging the vagina or rupture of the membranes does not arrest the hæmorrhage, the child can, if the condition is urgent and the cervix not fully dilated, be delivered by podalic version somewhat quicker and with less danger to the mother.

(4) *Prolapse or Expression of the Cord*.—When the cervix is fully dilated, the child is alive, and the cord prolapses or is expressed, the child should be delivered at once by forceps or version; the former, however, will give the best results.

(5) *Accouchement forcé*.—It is sometimes necessary in the interests of the mother to deliver the child as quickly as possible *per vias naturales*. As examples of this may be mentioned rare cases of eclampsia, heart disease, and pernicious vomiting. In such cases, when the cervix has been dilated, the quickest way to deliver the

child is by podalic version, perforating the after-coming head if necessary. If the child is alive, it must, however, be remembered that it will have more chance of survival if delivered by forceps.

(6) *Locked Twins*.—A very rare variety of locked twins is that

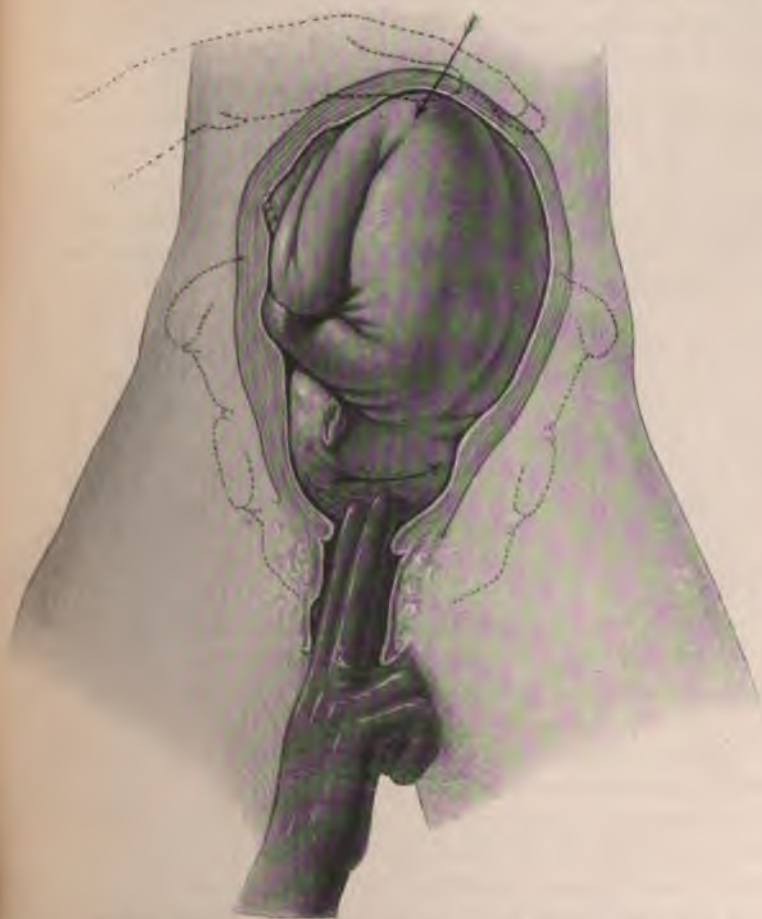


FIG. 2.—Bi-polar podalic version. Pushing head towards back.

in which the after-coming head of the first child gets impacted with the shoulder and prolapsed arm of the second child, which is lying transversely. The treatment in such a case is to decapitate the first child, deliver the second one by version, and lastly, the decapitated head by pressure, forceps or perforation as the case may be.

(7) *Double Monsters*.—There are two varieties of double

monsters in which it may be necessary to perform podalic version. (a) *Thoracopagus*. In this variety the twins are united along more or less of their trunks. When such a condition is diagnosed and the heads are presenting, it is best if possible to perform podalic



FIG. 3.—Bi-polar podalic version. Seizing a foot.

version, the reported cases which have been delivered spontaneously being expelled breech first; (b) *Dicephalus*. In this variety there is a single body with two heads. If the heads present, labour is almost certain to be obstructed, in which case the first head must be decapitated and the monster then delivered by podalic version.

(8) *Cancer of the Cervix*.—In advanced cases of this disease first seen in labour, if the cervix is not dilating well, it should be incised, after which the child may be delivered by version or forceps.

(I.) **Bi-polar Podalic Version.**—*Time for Operating.*—After

labour has commenced, before rupture of the membranes, and when the cervix will admit two fingers. An expert operator may be successful, even when the cervix will only admit one finger, and after the membranes have ruptured, but there must be sufficient liquor amnii for the child to move easily.

Position of the Mother.—See Bi-polar Cephalic Version, p. 464.

Position of the Operator.—See Bi-polar Cephalic Version, p. 464.

Steps of the Operation.—This depends somewhat upon whether the head or shoulder is presenting.

WHEN THE HEAD IS PRESENTING.—(a) The operator passes his first and second fingers through the cervix, supporting the uterus with his other hand externally.

(b) With his internal fingers he pushes the child's head in the direction of its back so as to get its knees over the os, and with his external hand he presses the breech down to the opposite side (Fig. 2).

(c) The operator loops his internal fingers into the popliteal space and pulls the child's leg through the os until the half-breech enters it, at the same time pushing the head up towards the fundus with his external hand; or he can take hold of the foot with his first and second fingers pressing the head down to get a good hold of the foot and then drawing the foot down at the same time push the head up.

WHEN THE SHOULDER IS PRESENTING.—The only difference in this case is that the internal fingers impinge on the shoulder instead of the head, and the first step, therefore, consists in pushing the shoulder towards the head with the internal fingers. The remaining steps of the operation are the same as those described for head presentation.

Difficulties.—(a) TOO LITTLE LIQUOR AMNII.—If the quantity of liquor amnii is insufficient, it may be found very difficult or even impossible to rotate the child. In the former case the steps of the operation are rather more numerous, since the child, after the head or shoulder, as the case may be, is pushed away, will not rotate readily enough to allow of the knees presenting at once, but some other portion of the trunk will present first, and must in its turn be pushed towards the head.

(b) TOO MUCH LIQUOR AMNII.—If there is an excessive amount of liquor amnii, the child may rotate too easily, when it may be found impossible to seize hold of the knee. In this case the membranes should be ruptured and some liquor amnii allowed to escape before the version is repeated, the hand being kept in position meanwhile.

(c) **MISTAKE IN DIAGNOSING THE CHILD'S KNEE.**—The knee may be mistaken for the elbow, the foot for the hand, and the fingers for the toes. It is important that the operator should make certain that he has got hold of the knee before he attempts to pull it through the os. It must be remembered that the knee points towards the head, the elbow away from the head; the foot has a heel and the toes are not so long as the fingers, nor is the great toe separated from its fellows as the thumb is from the fingers.

(d) **THE CHILD'S HEAD WILL NOT RISE TO THE FUNDUS.**—If the leg is not pulled well down so that the half-breech enters the os, the head may not rise to the fundus properly, and the child may remain in a bad position.

(II.) **Internal Podalic Version.**—This may be necessary when the head or shoulder of the child is presenting.

Time for Operating.—Internal version may be and generally is essayed after the membranes have ruptured so long as the contra-indications mentioned under General Considerations are absent. It is, of course, more easily performed before the membranes have ruptured. The cervix must be dilated sufficiently to admit the hand of the operator.

Position of the Mother.—The position of the mother is not a matter of much consequence, the left lateral position being that most usually favoured. Some advantage may be gained by choosing the position of the mother according to the position of the child. Thus, if the child's head is to the right, version will be easier if the woman is placed on her left side, and *vice versa*.

Position of the Operator.—If the mother is on her left side, the operator stands on her right and uses his right hand internally, or *vice versa*.

If the patient is on her back, either hand can be used internally. It is better to use that hand which corresponds to the side the child's legs are directed.

Steps of the Operation.—**WHEN THE HEAD IS PRESENTING.**—

(a) During the interval of the pains the internal hand is passed with the fingers and thumb approximated gently into the vagina, through the cervix, and past the head into the uterus, rupturing the membranes if they are intact. The external hand supports the uterus and presses it down somewhat to relieve the tension on its attachments.

(b) The internal hand is passed up towards the fundus with its back against the internal surface of the uterus till a foot or knee is reached. The external hand supports the uterus. Whichever leg is touched first should be pulled upon, except in the case when

there is more room on one side of the pelvis than the other, when it is better to pull on the leg corresponding to that side of the pelvis which is largest, as by doing so the occiput eventually rotates

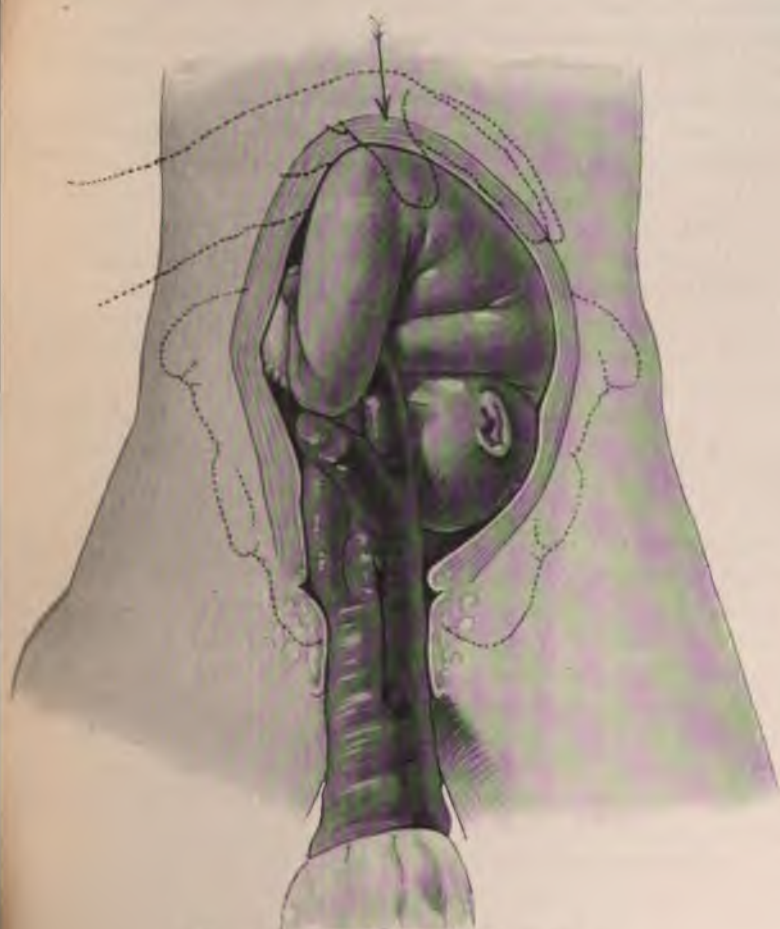


FIG. 4.—Internal version. Seizing a knee.

into it. It is immaterial whether the knee or foot is seized; whichever is first encountered may therefore be chosen (Fig. 4).

(c) The internal hand pulls the foot or knee through the os till the half-breech enters it, and the external hand at the same time pushes the head towards the fundus.

(d) The child can then be delivered if necessary by traction on the leg combined with pressure on the fundus.

(e) After the child is delivered a hot intra-uterine douche of 1 in 4,000 biniodide of mercury, followed by one of sterilised water, should be given.

WHEN THE SHOULDER IS PRESENTING.—The steps of the operation are the same as when the head presents, except that the internal hand, instead of pushing aside the head as it passes into the uterus, pushes aside the shoulder. If an arm is prolapsed, a tape should be tied round the wrist, and some authorities recommend that the arm should, if possible, be brought down for this purpose, then as the lowest leg (that is, the one corresponding to the prolapsed arm) is pulled upon, it will come forward, as also will the prolapsed arm, which being kept down by slight traction on the tape cannot become extended. By this manœuvre it is possible to prevent the anterior arm from becoming extended, which is an important point, as when the arms are extended it is the anterior one that is most difficult to bring down, and the delayed delivery of which so endangers the child's life.

Some authorities contend that in transverse presentations with the back of the child posterior, if the upper leg is pulled upon the child can be delivered more easily, because there will be no chance of the upper buttock catching against the brim of the pelvis.

Difficulties.—(a) DIAGNOSING THE FOOT OR KNEE. See Bi-polar Podalic Version, p. 468.

(b) ESCAPE OF THE LIQUOR AMNII AND RIGOROUS ACTION OF THE UTERUS.—If the liquor amnii has drained away and the uterus has contracted round the child, internal version may be impossible by the method just described. In fact, as already indicated, it must never be tried if the uterus is tonically contracted or there is a ring of Bandl, since the uterus will surely be ruptured. If, however, these contra-indications are absent, then the following methods may be employed: (i.) Traction with tape. A piece of tape is fastened round the foot, and whilst the tape is pulled upon with one hand, the other hand can be passed into the vagina and used to push up the shoulder; (ii.) Traction with a blunt hook. A small blunt hook covered with a piece of indiarubber tubing can be passed round the back of the knee, care being taken that its end does not impinge on the popliteal space, both hands can then be used in a similar way to that described in the preceding section; (iii.) Traction on both legs. If the above methods fail, both feet can be brought down, when very powerful traction can be applied. The operator must be careful to remember that these additional methods are dangerous, unless the greatest care is used and the patient is very deeply anæsthetised.

Dangers.—Besides the dangers mentioned under General Considerations the operator must be careful not to pass the hand through the cervix too quickly or before it is properly dilated, otherwise he may severely lacerate it; he should also always support the uterus and press it gently down whilst the hand is being passed; otherwise there is a very real danger that the uterus may be torn from its attachments.

ASPHYXIA NEONATORUM. The child may be asphyxiated during the extraction.

COMYNS BERKELEY.

GYNÆCOLOGY.

GENERAL POINTS IN THE TECHNIQUE OF GYNÆCOLOGICAL OPERATIONS.

THE technique peculiar to each of the gynæcological operations will be found described under the heading of the various conditions for which these operations are performed.

There are, however, certain principles of technique common to them all, and it is with these that the following article is concerned.

The Pre-operative Examination of the Patient.—It is necessary before performing any operation to ascertain the state of the patient's health in general, for neglect of this precaution may be fraught with disaster. The surgeon, therefore, must in private work at least personally examine his patient sufficiently thoroughly to exclude any condition which, being found, would contra-indicate the operation.

In this regard much depends upon the character of the contemplated operation and the urgency with which it is demanded.

Operations may be divided into those of necessity and those of expediency, and it is in respect of the latter that it is chiefly important to ascertain by previous examination whether the patients are fit to undergo them.

Cardiac disease may or may not be a contra-indication. Persons suffering from well-compensated valvular disease, especially mitral, bear all ordinary operations well; but when compensation is failing, nothing but urgency to save life justifies surgical measures. The most serious heart lesion from the surgeon's point of view is fatty degeneration, such as is commonly met with in elderly (and often alcoholic) patients. Such bear operations of any severity very badly, being liable to acute dilatation and failure of the heart as a result of the rapid cardiac action induced by shock or profuse hæmorrhage. Fatty degeneration of the heart is easy to overlook, the physical signs being often indefinite. Special attention should therefore be paid to the position of the apex beat, the force of the cardiac impulse and the character of the sounds heard.

Since most of these patients have, in addition to their heart lesion, a degenerate state of their blood vessels, it is very important

in elderly persons to examine the accessible arteries for signs of tortuosity or rigidity. Such a condition, combined with a feeble apex beat, slightly displaced outwards, and weak flapping sounds, indicates fatty degeneration.

Bronchitis, especially when combined with emphysema, is a serious drawback to any operation, for patients thus affected are almost certain to get more or less acute exacerbation of their lung trouble as a result of a general anæsthetic, especially ether. Operations of expediency, therefore, are contra-indicated until such time as the bronchitis can be cured or much improved by appropriate treatment, whilst those of necessity should be performed under chloroform or spinal anæsthesia. Persons suffering from pulmonary tuberculosis are liable to acute advance of the disease after an operation involving prolonged inhalative anæsthesia. Diabetes and renal disease both contra-indicate surgical measures, the former especially. It is,



FIG. 1.—Ring forceps.

therefore, most essential that the urine of every patient should be carefully examined beforehand.

Mental instability should always render the surgeon disinclined to operate, for a mind on the brink of insanity may break down from the shock of the operation. This, of course, applies to any operation, but especially so to bilateral oöphorectomy which in some patients, by reason of the sudden menopause it causes, produces more or less instability of the nervous system. In such cases the surgeon will do well to consult an alienist before deciding to interfere.

It is a wise precaution before performing any operation involving the removal of any part of the internal genitalia to obtain the patient's written consent. One may recall the undeserved trouble and anxiety to which a late eminent gynæcologist was put some years ago as a result of neglecting to protect himself thus. If the patient refuses to give the surgeon a free hand to perform whatever operation he deems best in her interests, he will be very ill-advised to undertake the case.

Instruments.—A large outfit of instruments is not necessary for gynæcological surgery, almost all the operations of which are

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capable of being performed with those ordinarily in use in general surgery.

Pressure Forceps.—Eight of these are required; Spencer Wells's pattern is excellent, but it is an advantage to have at least two of

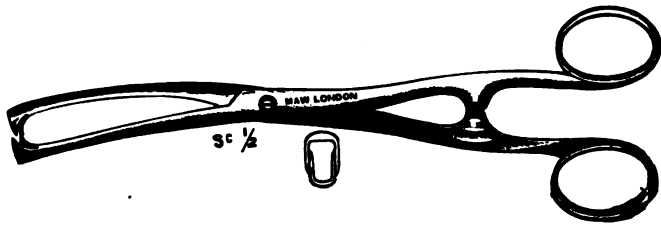


FIG. 2.—Fenton's volsellum.

them longer than the ordinary size, say 7 inches long, for use in the bottom of the pelvis. Kocher's pattern pressure forceps are useful when a considerable bulk of tissue has to be gripped.

Ring Forceps.—These most useful forceps can be made to serve

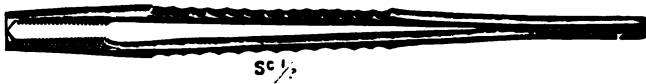


FIG. 3.—Bonney's dissecting forceps.

many purposes. They hold swabs well, they are admirably adapted for seizing masses of tissue, they make good bowel clamps for end-to-end anastomosis, they serve for clearance of the uterine cavity in cases of retained gestational products, and finally, owing to their

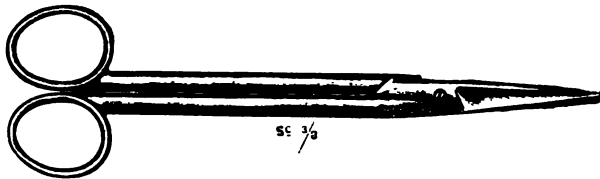


FIG. 4.—Mayo's scissors.

shape, it is easy to tie a ligature under them, a point of great importance when bleeding has to be controlled deep down in the pelvis (Fig. 1).

Volsella.—The best pattern volsellum forceps are those of Fenton. They effect a firm grip, and do not tear out and lacerate the parts seized (Fig. 2).

Dissecting Forceps.—These should be 7 inches long for use in the bottom of the pelvis. The pattern shown in Fig. 3 fulfil this measurement, and in addition are well suited for grasping masses of tissue and for withdrawing needles, instead of using the left hand to the injury of the surgeon's rubber gloves.

Scissors.—Scissors should also be of good length. For abdominal work the pattern illustrated in Fig. 4 is excellent.

For plastic vaginal operations angular-pointed scissors are useful.

Needles.—The most useful pattern, in the author's opinion, is that bearing his name. These needles have a flattened haft, which can be held in any ordinary pressure forceps, and the eye is large and round, rendering threading easy. The "curved" shape is most generally useful (Fig. 5).

For suturing the skin wound in abdominal section a long, straight 4-inch needle is best.



FIG. 5.—Bonney's needles.

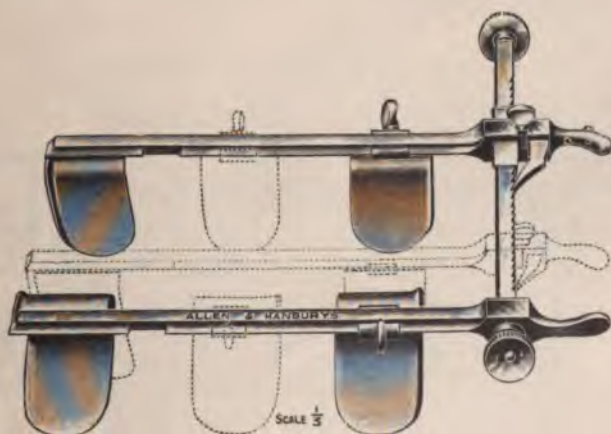


FIG. 6.—Berkeley's self-containing retractor.

Needles requiring special needle-holders should be avoided, as should needles permanently set in a handle. An exception to this is Worrall's notched needle, which is very useful in vaginal hysterectomy and other conditions in which the application of ligatures is difficult.

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Retractors.—For abdominal work, Berkeley's self-retaining retractor, modified from that of Gossett, will be found extremely useful (Fig. 6).



FIG. 7.—Fenton's uterine dilator.

For vaginal operations, Auvard's weighted speculum is almost a necessity for satisfactory retraction. In vaginal hysterectomy, and a few other conditions requiring manipulation high up the vagina, a narrow-bladed vaginal retractor is very handy.

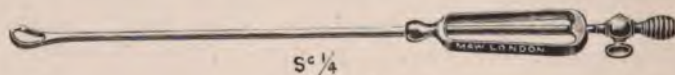


FIG. 8.

Uterine Dilators.—Those invented by Fenton are the best pattern. These instruments are very powerful, and require to be used with gentleness. Being double-ended, a smaller number is required to be carried (Fig. 7).

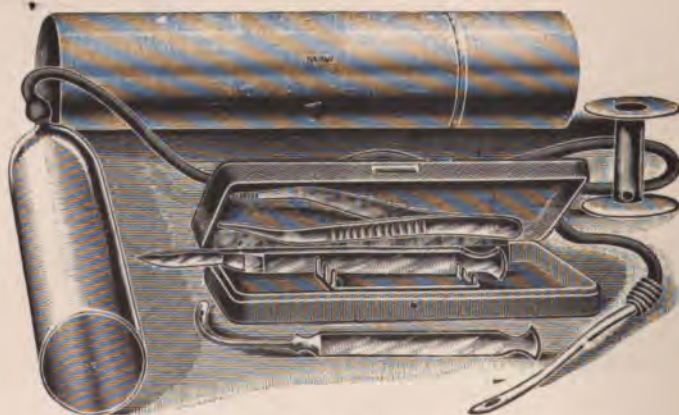


FIG. 9.—Berkeley's infusion apparatus.

Curette.—For curettage of the uterus a blunt, flushing curette should be used. For scraping the cervical canal a strong, sharp spoon is best, for, owing to the denseness of the tissues here, nothing less will eradicate the diseased glands (Fig. 8).

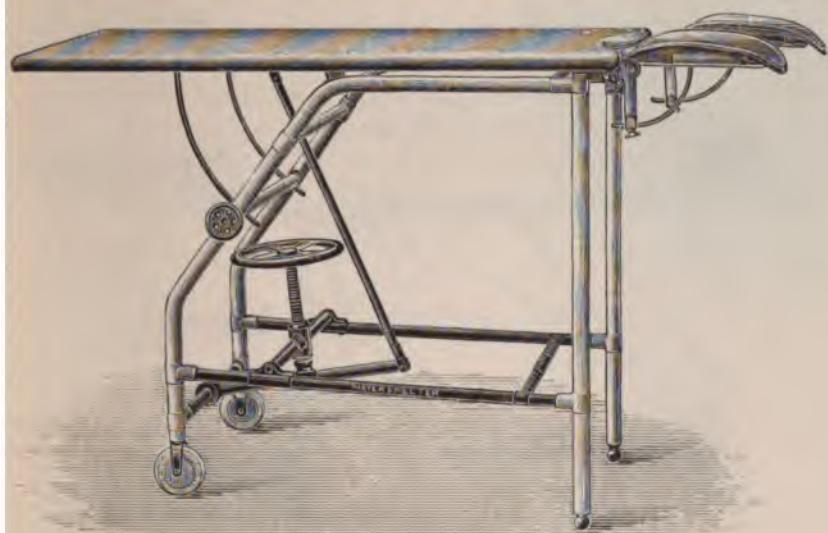


FIG. 10.—Spencer's table.

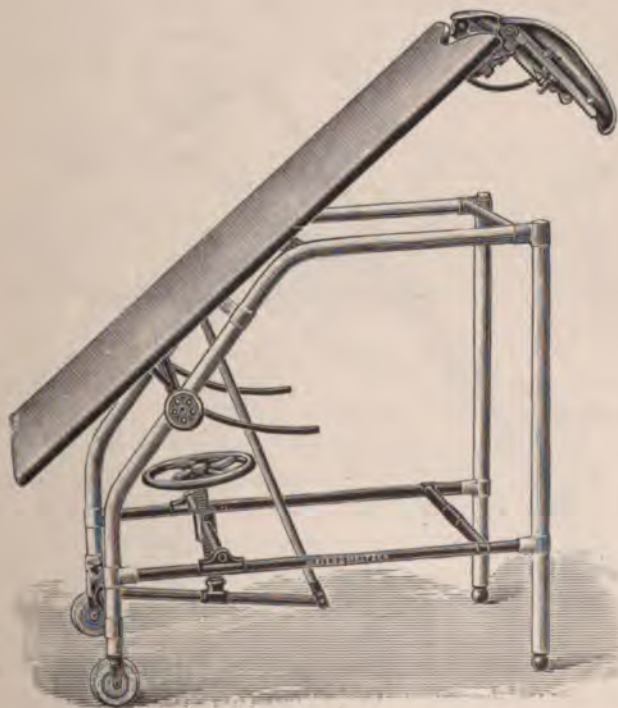


FIG. 11.—Spencer's table.

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Saline Infusion Apparatus.—An apparatus for saline venous infusion should reside permanently in the bag of the gynæcological

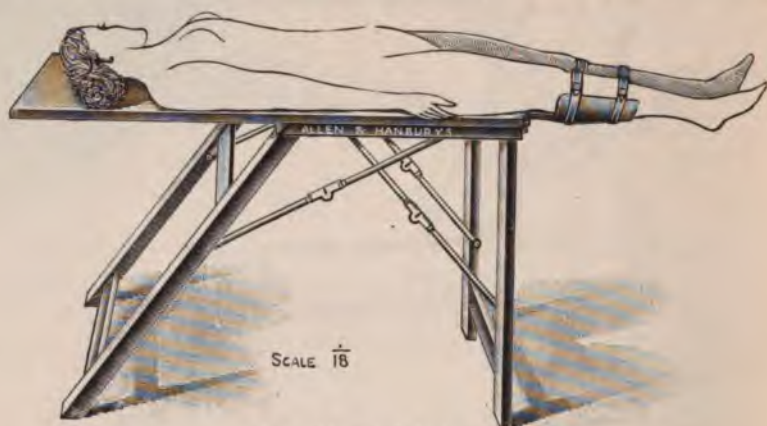


FIG. 12.—Berkeley's table.

surgeon. The compact outfit shown in Fig. 9 will be found very convenient.



FIG. 13.—Berkeley's table.

Operating Table.—For the proper performance of pelvic operations *per abdomen* a table capable of giving the true Trendelenburg tilt is requisite. For hospital purposes the simple,

yet most efficient, table designed by H. Spencer is perfect (Figs. 10 and 11).

For operations in private the surgeon should possess a portable table. Most of those on the market give a very faulty tilt, but that designed by Berkeley is correct in this respect, is light to carry (34 lb.), easy to erect, and, withal, reasonable in cost (Figs. 12 and 13).



FIG. 14.—Round ligament forceps.

If a proper table is not available, the surgeon will have either to operate with the patient horizontal, in which case the intestines will obstruct his view, or he must endeavour to get a tilt by raising the foot of the table on blocks or stools, or by lashing several bolsters together to form a wedge-shaped mass under the patient's buttocks. Both are clumsy and only partially efficient devices.

Retentive Apparatus.—For theatre work proper poles should



FIG. 15.—Bonney-Berkeley vaginal clamp.

be affixed to the end of the table to retain the patient in the lithotomy position. Failing this, Clover's crutch will be needed. For private work this is particularly useful.

In the absence of any such apparatus the lithotomy position can be maintained by means of towels or bandages.

Other Special Apparatus.—The above represent the chief instruments and appliances required. For certain special operations the following may, however, be mentioned:

The operation of intra-peritoneal shortening of the round ligaments requires a special forceps (Fig. 14).

In the radical abdominal operation for cancer of the cervix

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(Wertheim) a clamp to place across the vagina prior to amputating is a necessity. For this purpose no pattern will be found so efficient as that illustrated in Fig. 15.

The following lists of instruments will be found useful :

(1) *For Abdominal Operations*.—One scalpel, eight Spencer Wells's forceps, two ring forceps, one dissecting forceps, two blunt scissors, one volsellum, six curved needles (two No. 5, two No. 9, two No. 13), Berkeley's retractor, ligatures and drainage tube.

(2) *For Vaginal Operations*.—One scalpel, Auvard's weighted speculum, uterine sound, flushing curette, sharp scoop, Fenton's dilators, one blunt-pointed scissors, one sharp-pointed scissors, six Spencer Wells's forceps, two ring forceps, two volsella, Worrall's needle, six curved needles (two No. 5, two No. 9, two No. 13), ligatures.

Ligature Material.—The most generally useful ligature material is silk. It is cheap, very strong, easily sterilised, and the knot tied by it does not tend to slip.

Many surgeons prefer catgut on account of its absorbability. Against its use may be urged its greater difficulty of sterilisation, the insecure knot it forms, and the liability for absorption to occur prematurely.

In a septic focus any ligature material except unchromicised gut absorbs badly, and suture sinuses may be maintained by chromicised catgut as by other forms of ligature material under these circumstances. The use of catgut saves the patient the risk of late suture suppuration developing, say, three months after the operation, by which time it would have absorbed. Such results of buried ligatures are, however, rare when modern operative asepsis and antiseptics have been employed, and in the author's opinion do not occur often enough to counterbalance the disadvantages belonging to catgut as a material for sutures and ligatures.

If silk is used, the most convenient sizes are Nos. 4, 2 and 1.

For uniting the skin edges of an abdominal wound Michel's clips are better than any form of suture, for, not penetrating the skin, they avoid the seton-like track made by the latter, along which infection may spread to the buried sutures. In the best form of apparatus the adaptation forceps is furnished with a bridge on which the clips are carried. The resulting scar is very strong and leaves no stitch marks. The clips should be removed on the fourth day and a few strips of strapping applied.

For certain operations, notably perineoplasty, the device of Aveling's shot and coil is very useful. By it the sutures are fixed by threading their ends through a coil of silver wire and then

through a perforated shot, the latter being subsequently compressed. In removal the shot is cut off, the coil is withdrawn, and one of the long ends of the ligature left protruding is seized and pulled upon. This is much easier than groping between the buttocks to cut out stitches tied in the ordinary way.

Swabs.—The best material for swabs is gamgee tissue cut into squares of requisite size and sewn over at the edges. For abdominal operations two large ones (10 in. \times 10 in.) are required for packing off the intestines, and two packets, each containing six of a smaller size (6 in. \times 6 in.), for swabbing purposes. Only one packet should be opened to begin with.

The swabs are best used dry, and each one should be fairly soaked before it is laid aside. If this is not done the number indicated will often be found to be insufficient.

Some surgeons prefer to have the swabs wrung out in sterile water and used over and over again in the course of the operation. A less number is thus required, but the practice involves more manipulation of the swabs and a greater risk of septic contamination.

The importance of carefully counting the swabs, both before the operation commences and after the closure of the abdominal wound, cannot be too strongly insisted on. The same rule applies to the instruments.

For vaginal operations a number of small swabs (2 in. \times 2 in.) are required. This varies from three dozen, in the case of operations like vaginal hysterectomy, to one dozen for trivial procedures.

Rubber Gloves.—The use of rubber gloves is now universal amongst modern surgeons. Gloves should fit well; this is much more important than thinness of texture. They are best put on filled with a weak solution of mercury biniodide (1 in 4,000). The operator must avoid the habit of picking out needles with the hand and such-like manipulations, which entail risk of puncture.

Garb of the Surgeon and his Assistants.—The operator and his assistants should wear long overalls of linen. The sleeves must be long enough to tuck under the gloves at the wrist. Under the overall a mackintosh apron should be worn.

The use of masks when operating has everything to recommend it, for they prevent dust from the hair, sweat from the brow and saliva from the mouth from falling into the wound.

Sterilisation.—Sterilisation can be effected by steam, boiling or antiseptic solutions.

Sterilisation by steam is the best method to employ for bulky articles, such as overalls and towels. Swabs, gloves and instruments

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may also be conveniently sterilised in this way ; but in regard to the latter, they must not be kept too long in the sterilising drum after sterilisation or they will rust.

When proper apparatus for steam sterilisation is not available, *boiling* must be employed. This method is the one in common use for instruments, ligature material and gloves, and may be extended to swabs and towels. Overalls and sheets are too large to be thus treated.

Antiseptic solutions are reserved for primary sterilisation of the skin of the patient and the hands of the operator and his assistants, and they are also useful to maintain the sterility of instruments, ligatures and gloves after they have been boiled or steamed.

Of the various antiseptic substances the most generally used are the perchloride and biniodide of mercury, iodine solutions and carbolic acid. Of the mercury salts the biniodide is the best. For preparing the skin of the patient, Lockwood's solution, containing alcohol 3 parts, water 1 part, and biniodide of mercury in a proportion of 1 to 500 of the mixture, is admirable.

Iodine, in 2 per cent. solution in rectified spirit, is much in fashion for sterilising the skin at short notice.

Carbolic acid (1 in 40 of water) is the best preparation to immerse instruments and ligatures in, after they have been sterilised by steaming or boiling.

To one frequently called upon to perform operations in private the possession of a proper high-pressure steam steriliser is a great boon.

In many large English towns complete outfits already sterilised can be obtained from the instrument makers.

For hospital work the duties of preparing and sterilising the material necessary for the operation is relegated to the nurse in charge of the operating theatre.

Preparation of the Patient for Vaginal Operations.—For minor vaginal operations the patient need not be kept in bed for any length of time previously.

The bowels should be opened by a dose of castor oil, given early in the afternoon of the day immediately preceding the operation. By this means her night's rest will not be disturbed.

Early in the morning, at least three hours prior to the operation, a soap-and-water enema should be administered, after which the parts surrounding the operation site must be prepared.

The pubic hair should first be shaved. For minor operations removal of that covering the labia majora will be sufficient.

After this a bath should be taken, and the external genitals, perineal and anal regions in particular, are well washed.

A vaginal douche of 2 quarts of 1 in 2,000 solution of mercuric biniodide at a temperature of 100° F. is now administered. The vulva and the parts adjacent to it are again washed, and then swabbed over with the same solution.

The skin surrounding the vulva should then be further treated with Lockwood's solution (see above), or by painting with 2 per cent. iodine spirit solution. These strong chemicals should not, of course, be applied to the vulva proper.

The parts having been dabbed dry with dry sterile gauze, a pad of the same material is applied, and retained by a T-bandage until the operation.

It is very important that the bladder be emptied immediately before the operation. In most cases it suffices if the patient does this, but if there is any difficulty or doubt about it a catheter must be passed.

The patient should have on a clean night-gown, dressing-jacket, and a pair of long woollen stockings.

Preparation of the Patient for Abdominal Operations.—

When a severe abdominal operation is in anticipation and the patient's health is unsatisfactory, the patient should be kept in bed for some days beforehand, if she is not already there.

The bowels should be thoroughly emptied in the same manner as described for vaginal operations.

The pubic hair must be shaved, especially that over the mons veneris, after which a warm bath should be taken.

The preparation of the abdominal skin has now to be undertaken. This can be done by the nurse if she is reliable, otherwise the medical man should himself see to it.

The skin of the abdominal wall is first well washed with soap and water; after this ether or turpentine is applied on wool swabs to remove the surface grease. Finally, either Lockwood's spirit biniodide solution is well rubbed in or iodine solution is painted on, after which the part is covered by a compress of dry sterilised gauze.

It should be the object of the preparation to sterilise the surface of the skin without macerating it, and for this reason prolonged antiseptic fomentations or moist compresses are to be avoided.

Before the patient is placed on the table the catheter must be passed. It is not sufficient to get the patient to pass water herself, for under the influence of anxiety she may only partially empty the bladder or being emptied it may rapidly fill up again.

If this precaution is neglected, the bladder may be opened when making the incision through the abdominal wall.

Directions to the Nurse.—In hospital practice a definite

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routine obtains, which allows the surgeon to dispense with repeated directions to the nurse as to the preparation she is to make for the operation.

For operations in private, on the other hand, it is necessary for him to give minute instructions on this subject.

The nurse should see that there is provided (1) a long rubber rectal tube, (2) a nail-brush and germicidal soap, (3) a large-sized soft rubber catheter with a glass funnel attached for administering saline or nutrient enemata, (4) a bath thermometer, (5) some table salt for making salt solution, and (6) a bottle of brandy.

She should prepare the room by removing all unnecessary furniture, dusting it thoroughly and swabbing down all woodwork with mercuric perchloride (1 in 1,000).

The bed should be a single one, and the mattress of firm consistence.

Four tables are required: one for the anæsthetist, one for the instruments, one for the swabs and one for additional material. Plenty of hot and cold water should be at hand, and a sufficiency of clean towels; a pail or footbath is necessary to receive douche solution or soiled material.

Two large basins must be provided for the swabs, and a large dish (a meat-dish will do in the absence of a proper surgical dish) will be required for the instruments. These should be sterilised by carbolic acid solution (1 in 20).

In addition, two bowls full of that antiseptic solution which the surgeon prefers must be furnished, and, if possible, two basins should be set aside for the washing of the hands of the surgeon and his assistants.

If the nurse has further to provide the sterilised towels for surrounding the operation area, she should prepare these by boiling them and then transferring them to a weak antiseptic solution from which they are wrung out before use.

If the surgeon also desires her to sterilise the swabs he is going to use, these should be treated in the same way.

VICTOR BONNEY.

THE AFTER-TREATMENT AND POST-OPERATIVE COMPLICATIONS OF GYNÆCOLOGICAL SURGERY.

AFTER-TREATMENT.

In the routine after-treatment of gynæcological operations careful observations of the pulse, temperature, and respiration rate are most important.

The value of the pulse in estimating the condition of the patient after gynæcological operations cannot be too strongly insisted upon. It should be highest during the first twenty-four hours, but should not then exceed 100 after any ordinary procedure. At the end of twenty-four hours it should have fallen, a rising pulse after this period being very unsatisfactory. The temperature usually rises to 99° or 100° F. immediately after major operations, but it should not in "clean" cases exceed this. A rising temperature after twenty-four hours is of serious import.

A rapid respiration rate immediately after the operation is due to shock or hæmorrhage. Beginning after twenty-four hours, it suggests some grave disaster at the operation site, such as peritonitis or intestinal obstruction.

Position of the Patient.—After major operations the patient should be propped up in bed as soon as the shock and effect of the anæsthetic has passed off. This is specially necessary when drainage is being employed. In minor operations the position is not of importance.

Bladder and Bowels.—Six hours after all major operations the catheter should be passed in order to ascertain that the bladder is uninjured and the proper amount of urine is being secreted. After this the patient may be allowed to empty the bladder herself, but exceptionally, as after the radical operation for carcinoma of the cervix, catheterisation may be required for a long period. After minor operations the catheter need not be used unless the patient is unable to pass water herself.

After major operations the passage of flatus *per anum* is of great importance, and this is assisted by the regular use of the long rectal tube for ten minutes at a time every four or six hours,

beginning eighteen hours after the operation and continuing until such time as flatus is passed naturally. Not much flatus is to be expected by the tube until twenty-four hours have passed since the operation, but if after this period it does not escape freely, the rectum must be washed out as described on p. 490.

After major operations the bowels should be opened on the morning of the third day by an aperient given overnight, aided by an enema if necessary. After minor operations the bowels should be opened on the morning of the second day.

Diet.—For the first twelve hours after a major operation nothing should be taken by the mouth. Thirst during this period is lessened by washing out the mouth frequently with warm water. The injection *per rectum* of 6 oz. of saline solution every two to four hours is excellent in cases of shock, and mitigates thirst.

After twelve hours mouth feeding may be begun, first with small quantities of water, and later, if these are retained, with increasing quantities of milk and water, beginning with teaspoonfuls every hour, and increasing as the day goes on to larger quantities. For the first two or three days the diet should be liquid, consisting of milk, beef-tea, broths and meat essences at short intervals. Directly the bowels are open solid food may be taken.

The exact amount of fluid nourishment taken will vary in different cases, but in general it amounts to about 1 pint on the first day, 1½ pints on the second, and 2 pints on the third day after operation.

If vomiting prevents the retention of nourishment in the stomach, rectal saline injections should be substituted until it has passed off.

After minor operations ordinary diet may be allowed so soon as the effects of the anæsthetic have disappeared.

Dressings.—For abdominal operations a sterilised gauze-pad covered by sterilised wool is quite sufficient dressing. It need not be changed for forty-eight hours if all is going well unless drainage is being employed.

After minor vaginal operations any gauze packing should be withdrawn in twenty-four hours. After operations on the vulva or perineum the wound should be dressed as often as the bladder is emptied.

After all minor vaginal or vulval operations the patient should be douched at least twice a day with some weak antiseptic. Douching is also good after total hysterectomy, but not until a week has elapsed for fear of the solution finding its way into the peritoneum.

Post-operative Rest in Bed.—After major operations the patient, as a rule, may leave her bed at the end of three weeks or a day or two earlier if she has progressed without complications.

After minor operations the period in bed varies. About ten to fourteen days is sufficient after most of them, but plastic operations, such as perineoplasty or colporrhaphy, demand a week longer.

The skin stitches of an abdominal wound are removed at the end of a week, unless Michel's clips have been used: these should be taken out on the fourth day.

The skin sutures used in plastic operations, such as perineoplasty, may be removed at the end of a week, or left in until the tenth day.

POST-OPERATIVE COMPLICATIONS.

Vomiting.—Vomiting after gynæcological operations is of several kinds, the most important of which are as follows:

Anæsthetic Vomiting.—This varies in intensity according to the patient and the character and dose of the anæsthetic. It should not last for many hours, and requires no treatment other than refraining from worrying the stomach by attempts at feeding.

Irritative Vomiting.—This is due to a gastritis set up by the anæsthetic. It may be very persistent in some cases and last for several days. The contents of the stomach, often highly bilious, are rejected. A degree of flatulent distension of the stomach often accompanies it.

It is distinguished from the graver forms of vomiting by the fact that the abdomen presents no untoward signs, nor are the pulse and temperature unfavourable.

In such a case the administration of a teaspoonful of bicarbonate of soda in 3 oz. of warm water to which has been added a few drops of essence of peppermint is often followed by relief. The best treatment of all is to give no food by the mouth, maintaining the patient's strength by rectal injections of saline solution.

Neurotic Vomiting.—Vomiting due to neurosis is occasionally met with, usually in cases where grave disaster at the operation site is least to be feared. The patient is obviously trying to be sick, and the local and general conditions reveal no cause for anxiety. Many remedies may be tried, such as washing out the stomach, or a blister or mustard plaster to the epigastrium. In some cases the addition of a little brandy to the feed tempts the patient to retain it. There is often a craving for morphia in these cases. Rectal feeding is the final resort.

Peritonitic and Obstructive Vomiting will be dealt with under the headings of those complications.

Distension.—*Epigastric and Flatulent Distension.*—A certain amount of flatulent distension of the bowels occurs after most abdominal operations. It is probably due to the altered pressure conditions that obtain as a result of opening the peritoneal cavity. The distension usually begins in the stomach (epigastric distension) and gradually passes downwards, accompanied by painful consciousness of peristalsis, until the flatus begins to be naturally passed *per anum*. This event is rare until twenty-four hours have elapsed since the operation.

The condition has to be diagnosed from distension due to peritonitis or obstruction. Simple flatulent distension is always "soft," i.e., there is no great tension present or undue rigidity of the abdominal wall, and though it may be accompanied by a degree of bilious vomiting there is an absence of the signs of peritonitis and obstruction presently to be discussed.

It should be treated by the regular introduction of the long rectal tube for ten minutes at a time, and if this proceeding fails at the end of twenty-four hours to bring away flatus, a wash-out or enema should be administered. A rectal wash-out is performed by introducing through the rectal tube by means of a glass funnel 10 oz. of a solution of soap and water to which turpentine has been added in the proportion of $\frac{1}{2}$ oz to each pint. The fluid having been slowly run in is allowed to remain for five minutes, after which the funnel at the end of the tube is lowered into a basin of water and the solution allowed to run back, aspirating, as it does so, the gas from the bowel above. The proceeding is repeated three or four times until all the solution originally made is used up. The wash-out should be administered every four hours until the desired result is obtained.

If an enema is preferred, it should consist of 1 pint of soap and water to which $\frac{1}{2}$ oz. of turpentine has been added. As an enema is more exhausting to the patient than a wash-out, it should be reserved until the latter has been tried and failed.

The administration of eserine sulphate or salicylate (gr. $\frac{1}{100}$) every four hours by hypodermic injection, combined with strychnine sulphate (gr. $\frac{1}{33}$), is very useful in giving tone to the bowel wall. Infundibular (Pituitary) Extract in 20-min. doses is still more efficacious.

The Distension due to Peritonitis or Obstruction will be dealt with under those headings.

Pain and Insomnia.—More or less *pain* is felt after all abdominal

operations and after some vaginal procedures, such as perineoplasty. It should be worst during the first twelve hours. Pain coming on later than this indicates, as a rule, something amiss in the operation area.

After major operations it is unusual for the patient to sleep much during the first night, but persistent *insomnia* is unfavourable, being seen with painful conditions, such as peritonitis and obstruction or under circumstances of sepsis. It may also be the prelude to post-operative insanity.

It is good practice to give a small dose of morphia the first night after the operation if it is of a nature calculated to give pain. A sixth of a grain will usually suffice. Its habitual use is not advisable, for it masks symptoms, increases distension and vomiting, and its effects are not successful in septic states.

For persistent insomnia drugs like sulphonal, trional, paraldehyde or bromidia are better than morphia.

Shock and Hæmorrhage.—A consideration of the symptoms of these most important complications is very necessary, because they often closely simulate one another, whilst their treatment is diametrically opposed in nature.

Shock is usually a post-hæmorrhagic condition following a prolonged and bloody operation. Its symptoms date from the operation, whilst the symptoms of post-operative hæmorrhage appear some time afterwards.

In shock the patient is pale and cold, but usually quiet and listless, and not complaining of pain. The pulse of shock may be fast or slow. It is always small but—and this is a most important point—the artery is full, *i.e.*, its cord can be felt. Further, the superficial veins are normally visible.

In hæmorrhage, on the other hand, the pulse is nearly always fast, the cord of the artery cannot be felt, and the superficial veins are barely visible. A patient bleeding to death is always distressed and restless, “air hunger” is present and great thirst, and with internal hæmorrhage there is invariably more or less pain, rigidity and tenderness over the abdomen. The distinction between shock and hæmorrhage may be difficult, and always requires careful consideration.

The treatment of *shock* consists in maintaining warmth, lowering the head, and administering rectal injections of $\frac{1}{2}$ pint of saline solution every two hours, to which 1 oz. of brandy has been added. In the more severe cases continuous administration of saline solution, either into the cellular tissue or *per rectum*, is indicated, and gives excellent results. Intravenous saline infusion

is an alternative, but is not so good as the methods just mentioned, because its effect on the blood pressure is apt to be temporary. It may be supplemented by continuous infusion with advantage.

Adrenalin has been praised in this condition, but I personally do not think highly of it. Infundibular extract, alcohol and strychnine, in my opinion, are the most useful drugs.

If post-operative *hæmorrhage* is diagnosed, the only treatment is to immediately re-open the wound and secure the vessel, after which intravenous saline infusion should be performed. It should never be employed before the hæmorrhage has been arrested, as it merely precipitates the catastrophe under such circumstances. It is for this reason that the distinction between shock and post-operative hæmorrhage is of such vital importance.

Peritonitis.—Peritonitis following abdominal or pelvic operations may be either general or local.

General peritonitis is a disaster of the first magnitude, and few patients recover from it. The symptoms usually declare themselves about the third day: severe pain is complained of, especially in the upper region of the abdomen. The abdominal wall is motionless and rigid, and more or less distension is present. The pulse is quick and the temperature is usually considerably raised. Vomiting comes on early and is watery in consistence, and occurs independently of ingestion. The diagnosis is usually easy on account of the characteristic rigidity and tenderness of the parietes.

Treatment, to have any chance of success, must be prompt. The wound must be re-opened and the pelvis drained, while other openings should be made in the iliac and lumbar regions for the same purpose. Continuous saline infusion into the cellular tissue should then be performed with a view of maintaining strength, diluting the toxins, and promoting exudation through the drainage tubes.

The distension must be treated by rectal wash-outs, infundibular extract, eserine, and strychnine (see p. 490).

Local peritonitis is not infrequently seen after operations for inflammatory pelvic disease, such as a pyosalpinx. In "clean" cases its occurrence is most often due to the presence of a collection of blood, formed by post-operative oozing.

The lower abdomen is rigid and tender, and sooner or later a definite tumour can be felt there. In many cases the inflammatory mass makes its way up to the lower end of the wound and terminates in a free discharge of pus. In other cases it gradually subsides.

The treatment consists of antiseptic fomentations over the lower end of the wound and hot vaginal douches. If fluctuation is

perceived, the swelling should be opened and drained either through the abdominal wound or the posterior vaginal vault, whichever appears most convenient.

Intestinal Obstruction. — Intestinal obstruction following gynæcological operations may be either organic or paralytic. The first is due to direct narrowing or kinking of the gut by adhesions, ligatures, or shortening of some of the peritoneal folds. The second is a rare condition, in which a segment of the intestine becomes paralysed and collapsed, probably as a result of prolonged exposure and injury to its mesentery.

In either organic or paralytic obstruction the chief factor in the clinical condition is an acute ascending infection of the upper intestinal tract by intestinal bacteria in a state of exalted virulence.

In organic obstruction severe attacks of colicky pain occur, while in paralytic obstruction there is a total absence of intestinal movement.

Flatus is with difficulty brought away or not at all, in spite of the passage of the long tube and rectal wash-outs, and the distension progressively increases. Vomiting, at first only occasional, becomes frequent, the material ejected being "intestinal" and finally feculent.

In some cases of organic obstruction coming on slowly, diarrhœa may precede the symptoms of total occlusion.

The treatment consists in re-opening the wound and dealing with the obstruction, if it is organic in nature. If it is of such a nature as not readily to be relieved, the bowel above should be fixed in the wound and opened, and the correction of the occlusion left till a later date.

In paralytic obstruction a considerable segment of the bowel will be found collapsed; above this portion the gut is much distended. The treatment of these cases is difficult because there is no way of removing the obstruction. The bowel above must be opened, but it is useless to perform this on the segment immediately adjacent to that which is collapsed, for the intestinal walls are so inert that the aperture affords little or no relief. It is in most cases, therefore, necessary to perform enterostomy high up, a portion of the jejunum being chosen. This is the more necessary if the patient already has feculent vomiting, for this never occurs until the jejunum is full of the same material. Jejunostomy under these circumstances has given immediate relief. The artificial opening will have to be closed later either by suture or resection.

Cellulitis.—Pelvic cellulitis may follow operations on the uterus or vagina. The symptoms presented are similar to those when it

arises from causes other than operations, and the treatment consists in hot fomentations and vaginal douches until such time as pus is evident, when it should be let out by abdominal or vaginal incision.

Cardiac Failure.—In hospitals particularly many of the older patients are the subjects of general ill-health due to mal-nutrition or alcoholism. Amongst such fatty degeneration of the heart is common. These patients bear severe operations ill, the heart becoming acutely dilated under the strain.

The condition is very serious. Alcohol and strychnine are the most useful drugs; digitalis should on no account be given, as it often accelerates the failure of the cardiac muscle.

Pulmonary Complications.—*Bronchitis or broncho-pneumonia*, due to the anæsthetic, is not uncommon. It should be treated by a bronchitis-tent and the steam-kettle. Poultices to the chest are comforting, and the patient must be sat up.

The following prescription is useful: R—Ammon. Carb., gr. 3; Sodii Bicarb., gr. 20; Sp. Chlorof., ℥ 10; Aquam Anisi, ad 3j; every four hours.

Lobar pneumonia occasionally occurs, and requires the usual treatment. Septic pneumonia has been dealt with elsewhere in this work.

Pulmonary embolism is the most tragic catastrophe that follows gynæcological operations. It occurs about once in 360 cases, and is commonest after operations on the uterus, especially hysterectomy. It usually takes place between the tenth and twenty-first day following the operation. In most cases the patient dies after a brief period of dyspnœa, cyanosis and coma, but recovery is known.

The treatment consists in artificial respiration so long as the heart beats, injections of strychnine and ether, and the use of oxygen if it is available. Venesection is proper where, with great cyanosis, the heart is still beating strongly.

In most of these unfortunate cases no cause for the embolism is apparent. In some, slight fever and undue frequency of the pulse is noticed, probably due to sub-acute phlebitis. Very anæmic patients are most liable to the disaster.

Femoral Thrombosis.—This interesting complication occurs from the tenth to the fourteenth day as a rule. The left leg is usually affected. It may follow any operation on the female genitals, but is commonest after those on the uterus, especially hysterectomy. Its cause is unknown, but it is probably a manifestation of a generalised septicæmia of peculiar nature. It is

ushered in with fever and pain in the leg, and the swelling may take many weeks to subside.

The treatment consists in elevating the leg on a pillow and applying warm fomentations to allay the pain. Morphia may also be required. No movement should be permitted until all fever and pain and most of the swelling have disappeared.

Parotitis.—Parotitis following abdomino-pelvic operations is uncommon nowadays. It is most often associated with some septic condition of the operation area, and in these cases may be septicæmic in origin. In others it is probably secondary to oral sepsis. One or both glands may be affected. It usually subsides without suppuration, but occasionally pus forms.

It is to be treated by warm fomentations, and morphia may be needed to relieve the pain. If suppuration occurs, the gland must be incised, having regard to the important nerves and vessels in this region. The patient is always much debilitated, and will require tonics and alcohol.

Complications in the Parietal Wound.—Immediate *suppuration* of the wound is chiefly seen after prolonged operations on patients already infected. Suppuration usually, however, supervenes during the second week, and is then due to an infected buried suture. The abscess must immediately be freely opened up and drained and the offending stitch or stitches removed.

Stitch sinuses arising from buried sutures are very troublesome. Patience should first be advised unless the suture can be felt or seen, when it should be removed. For this purpose a steel crochet-hook is often successful. If in spite of waiting many months the sinus refuses to close, an attempt to remove the suture by cutting down on it is permissible. These operations vary in difficulty, being easy when the suture is situated superficially, but very difficult and distinctly dangerous if placed deeply, as, for instance, the ligature on the stump from which an ovarian cyst has been removed.

In dressing a suppurating abdominal wound the separated skin edges should be approximated as far as possible, so as to favour rapid healing, reduce the amount of scarring, and leave as strong a cicatrix as may be possible under the circumstances. The best method of doing this is by means of pieces of strapping fixed on either side of the wound, but terminating about 1 inch from the edge of the wound. These ends should be over-folded for about 1 inch and have pieces of tape attached to them. Each strip should then be attached to its *ris-a-ris* on the opposite side of the wound by tying the pieces of tape together across the middle line. Frequent

re-strapping of the wound for purposes of dressing, which may produce an eczematous condition of the skin, is thus avoided.

Bursting of the wound is a serious complication, and most often occurs in persons with weak parieties and post-operative bronchitis and cough. It may also occur as a result of excessive retching. All or some of the sutures may give way. In the former case the bowel extrudes through the wound, and will be found under the dressing. If the skin layer has held, the bowel becomes adherent to its under-surface, and symptoms of intestinal obstruction appear.

The condition is obvious when the bowel extrudes. When the skin layer has held, the presence of a resonant tumidity along the wound with oozing of blood or serum between the stitches should suggest the disaster.

In the first case the bowel should be washed with saline solution and returned, and the wound re-closed. In the second the skin sutures must be taken out, the bowel separated from its adhesion and returned, and the wound closed anew.

A *scar hernia* is commonest in wounds that have suppurated and are weak from this cause. It may also be due to sutures giving way prematurely or to natural flabbiness of the tissues of the abdominal wall, especially when increased intra-abdominal tension is present as well.

Scar herniæ should be operated upon, except in the case of very large ones, in feeble fat women, when an abdominal belt will be found more satisfactory.

The operation consists in opening the abdominal cavity above the hernia sac, exploring its contents, and then re-secting it together with the skin covering it. Adherent omentum or gut must be dealt with as appears most convenient. The edges of the wound are trimmed up and are then closed by several layers of sutures.

Bladder Complications.—*Cystitis* is not uncommonly seen after gynecological operations, especially certain of them. Thus after radical extirpation of carcinoma of the cervix a degree of cystitis is almost invariable. Operations for suppurative conditions of the pelvis, especially when followed by local peritonitis or cellulitis, are often followed by pus in the urine. Finally, catheterisation may be the cause of it.

When secondary to pelvic suppuration or extensive operations in the neighbourhood of the bladder, the colon bacillus is the common causative organism.

The bladder must be washed out twice daily with boric acid solution, and salol or urotropin given by the mouth.

Retention is common immediately after gynecological operations,

especially those disturbing the relations of the bladder. Urine often fails to be naturally voided in the recumbent position. In some patients the inability is due to nervous causes. It is unlikely that the bladder will be able to be naturally emptied if the vagina has been packed.

The catheter must be passed regularly in all conditions in which a full bladder would adversely influence the operation site.

Incontinence may be due to overflow from distension, or to a vesical or ureteric fistula. In the first case the catheter must be used. In the second the aperture must be sutured, but not until all cystitis has disappeared. The third is the most serious. Some of these fistulæ may close spontaneously. If this does not occur, the ureter must be implanted in the bladder or the kidney on that side removed. Pyelitis usually complicates a ureteric fistula.

VICTOR BONNEY.

THE MANAGEMENT OF PUBERTY AND THE MENOPAUSE.

THE entrance on and the exit from the reproductive period of life are, in woman, characterised by marked physical, mental and emotional changes. In the former, termed *puberty*, or (on account of the appearance then for the first time of the menstrual flow) the *menarché*, the changes are evolutionary in their type; they consist in the growth of the body of the uterus and of the external genitals, in the enlargement of the pelvis and mammary glands, in the appearance of hair on the pubes and in the axillæ, in the rounding of the rather sharp body outlines of childhood into the contours of maidenhood, in the commencement of menstruation and in the more regular occurrence of ovulation, and in the awakening of the sexual sense as revealed by greater sensitiveness, reserve, individuality and idea of duty; the irresponsible tomboy girl becomes conscious of the special duties, privileges, and possibilities of her sex. At the latter crisis of life, termed *the menopause* by reason of the cessation of menstruation, the changes are chiefly involutory in character; the glandular tissue of the breasts atrophies, the uterus, Fallopian tubes, ovaries, vagina and vulva shrink, the body outlines become angular on account of the disappearance of fat, or, in some cases, irregular by reason of its deposition in greater amount, menstruation and ovulation cease, hairs may appear upon the face, and, speaking generally, life becomes slower; with some degree of suddenness the woman grows old, and the transition is often accompanied by nervous and even by mental phenomena of a disturbing nature.

PUBERTY.

Many girls pass through the period of puberty and experience the onset of menstruation with no disturbance of the bodily or mental health; and in their case no special management is needed or treatment called for, save that which a sensible and affectionate mother can give in the course of a short conversation. She certainly ought to prepare her daughter for the appearance of a red discharge from the vagina; for the absence of this knowledge has

caused some young girls hours of mental agony and has driven some to try to check the bleeding by cold baths or at least by putting their feet in cold water. There ought surely to be enough confidence between mother and daughter as to allow the one to give and the other to receive such information without offence. A few words explaining the nature and meaning of the menstrual flow are all that is necessary; and very often the occasion of the girl's going to boarding school or paying a visit away from home can be used to explain the meaning of the sanitary towels which are being placed in her luggage.

The mode of establishment of menstruation varies in different cases. There may, for instance, be several months during which there is backache, languor, malaise and digestive disorders, and during these months the discharge is gradually becoming regular and free; under these circumstances bodily and mental rest at the monthly periods may be needed, but in most instances the enforcement of the great health maxim, "be not solitary, be not idle," will be found to suffice. In cases of *delayed menarché*—always the cause of anxiety to mother if not also to daughter—the general health must be attended to; any obvious disturbances, such as anæmia, chlorosis, constipation, overstrain showing itself in headaches or choreic movements and the like, should be treated; in the absence of any recognisable cause of ill-health, I have found the regular use of the permanganate of potash pill (1 gr. of the permanganate made up with kaolin) for weeks at a time of value, although its mode of action may not be easily explicable. But if the non-establishment of the flow is associated with marked symptoms of pain in the pelvis getting worse with each recurring monthly time, no delay should occur in making a local examination, for an imperforate condition of the hymen or lower part of the vagina may be found. If such is the case, operative interference will be indicated to allow of the escape of the menstrual fluid which has been retained in the vagina and may even be distending the uterus and Fallopian tubes. The incision in the hymen or other membrane must be made with strict regard to asepsis; it ought to be free enough to evacuate all the retained fluid, for it must be borne in mind that the altered blood is very prone to be infected; the washing out ought to be thorough, and any bleeding points or raw surfaces must be closed. The examination of the genital organs of the non-menstruating girl may reveal not an imperforate but an undeveloped state of the parts, *e.g.*, an infantile uterus; and, again, in rare cases the discovery may now be made for the first time that the supposed girl is really an imperfectly developed

or hypospadiac male; these are difficult cases to treat with both wisdom and satisfaction. Iron, arsenic, and exercises may prove beneficial in the former case; in the latter a restatement and re-registration of sex may be necessary.

It will be well at the time of puberty for the girl to be instructed that some of the reputed dangers of the establishment and occurrence of menstruation are much exaggerated. For instance, the use of water for washing is not necessarily full of risk, and the ordinary practices of cleanliness are not to be abandoned at the periods; neither are purgative medicines to be avoided if the need for them exists. At the same time puberty does mark a crisis in a girl's life, and the recurrence of the flow each month brings with it a certain amount of disturbance of the metabolic processes. It was on this account that W. S. Playfair¹² some years ago uttered a timely warning regarding the education and training of girls at puberty, pointing out that the mistresses of high schools were inclined to disregard the function of menstruation and to act as if girls could do as much mental work and take as much exercise and of the same kind as boys. There is no risk nowadays of the developing girl being forced to lead the useless sedentary life of women in the early Victorian period; the danger rather lies in the attempt that is in some places being made to prescribe for her the same sort of mental work, the same games, and the same rules of hygiene as are applied to the boy. There is a difference between the developing girl of fourteen and the boy of the same age, and this difference must be reflected in the education of the former^{1, 3, 7, 15}; further, it can be so reflected without the giving up of the principles of training which have done so much to replace the sickly, lackadaisical, drawing-room miss of some decades ago by the healthy, athletic, mentally well-equipped girl of to-day. The training of the young girl should be the result of the careful consideration of her requirements, future as well as present, and it certainly ought not to be a simple replica of that given to the boy.

Another anomalous form of menarché is expressed by the term "*precocious puberty*." Menstruation in temperate climates may begin before the age of ten years, and this occurrence, if accompanied by a premature development of the mammary glands and of the external genitals with the early appearance of hair on the mons and in the axillæ, is rightly termed *pubertas præcox*. As the sexual passions are sometimes equally forward in these little women, and as early maternity has not uncommonly been observed in them, it will be seen that careful watching and discipline may

be called for. It is a fact of some significance that this form of functional precocity has in some instances been accompanied by the growth of cystic or malignant tumours of the ovaries.

A menarché with *menorrhagia* from the beginning is rare^{8,9}; it may be explained by the presence of a fibroid tumour; more often it is the expression of some hygienic error, such as constipation or dietetic irregularity. *Dysmenorrhœa* has often the same explanation. In both cases the correction of such errors should be ensured before any local examination is thought of. In *menorrhagia viburnum prunifolium* has been found of service.

THE MENOPAUSE.

The menopause is much more often the cause of trouble to women than is puberty. At the cessation of menstruation (from the forty-fifth to the fiftieth year) the individual has arrived at an age when digestive, circulatory, hepatic and renal disorders are commoner than in early life, and when rheumatism and gout, if latent hitherto, are beginning to make themselves evident. As a consequence the menopause is not only in itself a cause of disturbed bodily and mental health, but also coincides with an epoch when ailments of various kinds are frequently met with. For this reason (although there are others) the change of life has come to signify a period of distress, often prolonged, in the reproductive life; and no great surprise is manifested when a previously healthy woman is found to have become less or more of an invalid at the climacteric. The first aim of rational therapeutics must be the correction of this popular, fatalistic view-point.

In the first place, distressing symptoms, whether they are dyspeptic, syncopal, eczematous, hysterical, or what not, should be treated by ordinary medicinal and hygienic means, and should not be regarded as simply due to "the change," and therefore incurable or best left alone. *Dyspepsia*, with its concomitants, constipation and diarrhœa, is apt to be very troublesome, and calls first for a regulation of the diet, for at this time of life there is a tendency to enjoy the pleasures of the table somewhat more than in the earlier and often the more strenuous years of married life.

Exercise, which many women at the menopause begin to neglect for carriage or motor driving, must be kept up or replaced by massage or systematised movements; this will also prove beneficial in checking the deposit of fat in the abdominal walls or omentum (*polysarcia abdominalis*), often a great source of discomfort and even of dismay to the patient. In addition, fatty and sweet foods should be taken in strict moderation, and the amount of fluid should be

restricted. Bathing and, in some instances, Turkish baths should be taken.

Flushes of heat are often complained of, and *tachycardia* is not an uncommon symptom, although the two phenomena are not necessarily connected; the bromides are useful for the former, whilst ovarian substance may be taken with benefit for the rapid heart action. A convenient form of the latter is the 5-gr. "tabloid" of "varium." When ovarian extract fails, suprarenal extract or pituitary fluid (G. Carli) may be tried. *Digitalis* is not as a rule indicated.

Insomnia, nervous depression, or mental irritability are great plagues to many women at the change, and it must be borne in mind that it is a trying period of life for the woman who often sees her husband showing as yet no signs of age whilst she is by common consent regarded as an old woman, one whose business in life and many of whose interests are over. The result is that she falls often into two grave temptations, which are not uncommonly dignified by the name of therapeutic measures and prescribed by the medical attendant, narcotic drugs and alcohol. These two forms of treatment must be very carefully scrutinised, for they bring dangers with them which are often greater than those associated with the menopause. Many a woman has first become a drug-taker or an alcoholic at the climacteric, and the evil habit has long outlasted the two or three years during which it was contracted and during which there was some slight evidence that it was of problematical value. The medical attendant should think twice before he authorises the use of morphia (in any form), of chloral, of veronal, of cocaine, or of alcohol for the amelioration of the symptoms of the menopause. He should try to find other means, medicinal and hygienic, of relieving suffering, and should give a place to the bromides (but even they should be carefully kept in hand), to strychnine, to iron, to arsenic, and particularly to exercise, change of scene, visits to spas, and the like; he should encourage the woman to fill her life with interests, and should endeavour to surround her with young life and with cheerful companions, whose desire it is to prevent her feeling that she is in any degree "on the shelf." But if, in his opinion, narcotics and alcohol are to be recommended (I believe the contingency will be rare), he should keep their administration strictly under his control, and he should consider it his duty to order their discontinuance when the necessity for their administration has ceased.

There are, on the contrary, some few cases in which women at the menopause have plunged into a vast amount of work of various

kinds, charitable, social, educational, political, religious, have taken on endless responsibilities, and have developed a state of *overstrain and neurasthenia*; for them the very opposite form of treatment—seclusion for a time and the rest cure with high feeding—is clearly indicated if a happy and healthy old age is to be enjoyed. The mental state at the menopause always needs watching.^{2, 3}

One other matter requires the most careful attention: I refer to the recognition of menstrual anomalies at the change or after it^{1, 4, 6, etc.} The occurrence of *metorrhagia* or even of *menorrhagia* at the menopause, and much more the so-called "return of the period" after the change has been established, should always be regarded with grave suspicion, for it may, and very often does, indicate cancer of the cervix or body of the uterus. Pain and the development of a stinking vaginal discharge are usually later phenomena, and the time of their appearance is almost invariably the date when any hopeful operative interference is no longer possible. In the "crusade against cancer" great emphasis has been laid, and rightly, upon making these facts better known among women; and midwives, monthly nurses, and women health visitors have been supplied with leaflets containing details which will enable them to warn and advise women in this matter. It may turn out that the symptoms are due to fibroid growths, to senile endometritis, or to purely vaginal morbid states; but the right plan for the woman to follow is early consultation with a doctor. Whatever be the cause of the irregularity, it should at once come under medical supervision, and if it turns out to be a malignant condition, early operation gives the only hopeful line of treatment.

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DISEASES, AFFECTIONS AND INJURIES OF THE VULVA.

INTRODUCTION.

THE scope of the present work does not permit discussion of etiology, pathology and diagnosis, but a few preliminary words will enable us better to approach the subject of treatment. Forming as it does a muco-cutaneous junction, the vulva is liable to the various diseases which affect skin and mucous membrane, and the list of morbid conditions here observed is much the same as the series found about the mouth, although the relative frequency of such conditions is different. Thus we find in the vulva erythema, eczema, herpes, erysipelas, thrush, noma, diphtheria, tuberculous and syphilitic lesions and epithelioma.

The lymphatics in the groin and Scarpa's triangle play an important part in vulval infections. The old idea that these lymphatics may be divided into an upper set receiving lymph from the genital organs and a lower set receiving from the thigh and leg only is fallacious and must be discarded. It must also be remembered that the lymphatics on one side may pass to glands on the opposite side. Those of the lower third of the vagina also reach the inguinal glands.

The labia majora may, like the scrotum, be the seat of hernia, hydrocele, hæmatoma or varix. The parts are liable to various kinds of trauma and have great vascularity, and they swell up readily from inflammatory œdema or passive congestion. Their vascularity is much increased in pregnancy. They are liable to injuries incident to sexual and reproductive processes, and are especially exposed to specific infection.

In infants and uncleanly persons no parts are more liable to become sore and inflamed from neglect, and the accumulation of smegma around the prepuce and nymphæ has an irritating effect; in fat people intertrigo may occur without much neglect. As in other hairy parts parasites may be found here. The effects of masturbation must not be forgotten. The migration of thread-worms from rectum to vagina is an occasional cause of local irritation.

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Effect of Irritative Discharges.—The vulva, perineum and adjacent parts of the thigh are very liable to be inflamed by discharges flowing from the vagina, rectum or bladder, especially when these are septic or otherwise irritative, and it will be well to refer to them in detail. Apart from septic puerperal discharge and abnormal conditions of the menstrual excretion, we have to mention the various forms of leucorrhœa, such as that set up by a pessary, tampon, or other foreign body which by retention in the vagina has become foul, also the discharge from gonorrhœa or from necrotic or malignant new growths, and from sinuses opening into the genital tract or from septic wounds. In cases of vesico-vaginal fistula, cystitis or diabetes mellitus, the urine causes irritation, and when there is a recto-vaginal fistula, ruptured perineum with incontinence of fæces, or purulent rectal discharge, a similar result occurs. The effect is greater when the patient is feeble or out of health, and in young infants or bedridden cachectic women. When there is a tendency to eczema, such irritation is especially troublesome. When the vulva is inflamed, the anal folds are often swollen and the patient may think that she has piles. In chronic procidentia all the parts may be inflamed, excoriated or ulcerated.

Useful indications for treatment are found in the foregoing considerations. The preservation of *surgical cleanliness is essential in vulval disorders*. In infants, in addition to frequent bathing, attention must be given to the diapers. A common mistake is to use diapers which, having been saturated with urine, have been dried but not washed. Washing them in strong soda solutions makes them irritating to delicate skin. The practice of "holding out" infants at regular times from the first greatly promotes regular action of the bowels and facilitates cleanliness. The parts must be thoroughly cleansed and dried, and powdered with suitable dusting powders (*see* Formulæ Nos. 1 to 14). When the skin is broken, boric acid ointment may be used to protect the surface, and to this some coal tar derivative may be added with advantage (Formula 20). In adults the daily use of the sitz bath may be advised. The idea that a woman may not take a bath during menstruation is a common fallacy, and when a woman is suffering from vulvitis it is absurd to omit such a valuable local measure as a bath for the greater part of a week. When there is leucorrhœa, suitable vaginal injections must be ordered (Formulæ 5 to 14) and irrigation of the vagina during a bath is useful. For cancerous discharges injections containing carbolic acid or its preparations answer as well as anything (*see* Formula 12). The use of a tampon packed into the vagina and changed frequently will help to prevent dis-

charge from flowing over the vulva, and the tampon may be impregnated with an antiseptic.

All vaginal pessaries should be removed for cleaning at sufficiently frequent intervals, especially those made of indiarubber. The removal of vulval hairs, when the discharge is copious, favours cleanliness.

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INFECTIONS OF TUBERCULOUS OR DOUBTFUL NATURE.

THERE are certain cases of ulceration of the vulva which are apt to perplex the practitioner, such as have been described under the names *Lupus Vulvæ*, *Ulcus Rodens Vulvæ*, *Esthiomène* and *Tuberculosis Vulvæ*. How many different conditions are here included cannot be clearly stated. There is more or less localised hyperplasia with small nodules of growth, and at the same time a chronic ulcerative process which may penetrate rather deeply. If the ulcers heal, they are very apt to relapse.

In some of these tubercle bacilli can be found, in others not. Hutchinson thinks that *esthiomène* is a manifestation of syphilis in a tuberculous subject. Most recorded cases have occurred in prostitutes. Some good drawings of such conditions will be found in Auvard's "*Gynécologie*."

In any case, if the case is not syphilitic or refuses to yield to anti-syphilitic treatment, extirpation of the diseased area is probably the best plan to adopt. If the case is not suitable for the knife, some method of cauterisation, such as acid nitrate of mercury or the actual cautery, may be used. Enlarged inguinal glands should be removed. The case must be kept under regular observation, because the tendency to recur is great. The X-rays or Finsen light may help us in some cases.

Noma Vulvæ.—This is a necrotic process, occasionally seen in the vulva of a child of low vitality and probably determined by some injury. In one case in which I could not ascertain that there had been any local cause a slough separated. The case was treated with simple antiseptic dressings and general tonics, with good food, etc., and the wound filled up with healthy granulations. Gangrenous vulvitis may complicate asthenic forms of acute specific diseases. The disease is so rare that no generalisation as to treatment is here attempted.

Kraurosis is a rare disease, a chronic atrophic fibroid change in the vulva in advanced life. Sometimes it has followed pruritus. The only treatment that is of any avail is to excise the whole affected area, stitching the mucous and cutaneous edges together. Epithelioma sometimes follows kraurosis, and this is a reason for advising operation.

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INJURIES OF THE VULVA.

THE commonest injuries are lacerations caused during the second stage of labour, when the perineum may be torn to a greater or less extent, and the lower part of the posterior vaginal wall also. The treatment of these injuries is described elsewhere.

Secondary suture of ruptured perineum after cicatrisation is an exceedingly successful operation if performed by the modern method of flap-splitting and buried catgut sutures. It hardly ever fails. The details lie beyond the scope of this article.

Apart from lacerations during childbirth, severe injuries may be caused by falls upon broken glass or china, or by falling astride a sharp edge or rail, etc. Violent hæmorrhage may result, especially if the patient is pregnant or if the veins are varicose.

The external genitals are sometimes the seat of injuries received in coitus. A good account of these will be found in a paper by Neugebauer¹, in which 157 cases are analysed.

Such injuries vary from a simple laceration of the hymen, which may give trouble in exceptional circumstances by inordinate hæmorrhage, to severe lacerations and ruptures extending to perineum and sphincter ani, rectum, and vaginal wall. The vaginal fornices have even been opened up so as to expose the peritoneal cavity and para-vaginal cellular tissue. The bladder and urethra also have been injured. Gonococcal or syphilitic infection may complicate the injury.

The causes are found in great disproportion between the male and female parts and in violent coitus, especially in assaults on young girls and old women, where the female parts are small through immaturity or senile atrophy. In some cases the genitals have been malformed or of permanently infantile type. Sometimes the occurrence is traceable to drunkenness of one or both parties or to morbid and debauched sexual passions and conduct. The anterior wall of the vagina is more frequently injured than the posterior. Occasionally some previous operation or injury has left the parts vulnerable or stenosed. Hæmophilia, so rare in the female, has very occasionally been responsible for inordinate degrees of bleeding.

Treatment is carried out on general surgical principles. Most cases of bleeding from lacerations of the hymen can be stopped

by packing with gauze, which may be saturated with adrenalin solution (1 in 1,000). In all serious injuries place the patient in the "lithotomy" position in a good light, anæsthetising a sensitive patient for the purpose. Coapt the surfaces and arrest the bleeding by ligature of vessels or by deep sutures.

For deep penetrating wounds a gauze drain may be needed. Let the patient rest in bed after all injuries of doubtful extent or nature until convalescence is established. The catheter will often be required for temporary retention of urine.

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INNOCENT TUMOURS OF THE VULVA.

Acuminate Condylomata.—Sometimes the vulva is covered on its cutaneous and mucous surfaces with small warty growths, pointed and more or less pedunculated. These are usually venereal, but by no means always so. They may appear in pregnancy and disappear after delivery.

Treatment consists in snipping them off with scissors and cauterising each base with liquor hydrargyri pernitrat. If in cutting them off you find that here and there you have gone deeply enough to cause troublesome bleeding, a few catgut sutures may be passed to close such raw places. During pregnancy condylomata may in most cases be left alone.

Simple Fibrous Tumours of the vulva are sometimes met with and may have a well-defined pedicle. They are easily removed.

Elephantiasis Arabum is a disease causing great hyperplasia of the tissues of the vulva, including the skin. Lymphatic stasis with enlargement of the lymph vessels and spaces is a characteristic feature of this condition. The skin may be verrucose or occasionally smooth. In this country occasional examples of the same nature are met with, although the observers seem frequently in doubt as to whether the cases are true elephantiasis. When a specific history is present, they have often been described as condylomatous. I have operated on two cases in the last fifteen years in which general hypertrophy with varicosity of the lymphatics led me to consider them as true elephantiasis. The prepuce and both greater and lesser labia formed a large flap overhanging the vulva; the skin over the mons veneris was also thick and œdematous.

For all cases removal by the knife is the correct treatment. Bleeding is apt to be troublesome, but can be controlled by hæmostatic forceps, ligature and deep sutures. The vaginal mucosa is stitched to the edge of the skin, the meatus urinarius being fixed at the upper angle of the triangular vaginal opening. The results are good, for there does not seem to be much tendency to recurrence.

Lipomata and some other rarer forms of benignant growth are sometimes found in the vulva, but their treatment calls for no special remarks.

Cysts.—Sebaceous cysts and simple mucous cysts may occur

in the vulva and their treatment calls for no special comment, but the cysts that arise from occlusion and distension of the ducts of Bartholin's glands require careful treatment.

Bartholin's ducts are infected by the gonococcus or other micro-organisms, and inflammation of the gland arises. This may sometimes be subdued by simple local measures, such as fomentation, but often a cyst arises in the duct and an abscess follows, which may involve the whole gland.

Simple incision is not enough, for the abscess is apt to continue to discharge indefinitely. It is best to dissect out as much of the cyst wall as possible. About two-thirds is easily dissected, but the remaining third is more firmly attached to the deep tissues where the vessels enter, and here the capsule will usually tear through and the bleeding may be free; but so long as the greater part of the capsule is removed the cavity will heal from the bottom. Bleeding is best controlled by passing deep catgut sutures to draw the tissues together. The upper part is then packed with iodoform gauze and left to granulate.

After excising the gland on one side take the opposite labium between the finger and thumb to detect any enlargement; if another cyst is threatening to form, it is best to excise at once and so save future trouble.

Hydrocele of the Canal of Nuck extends from the groin more or less into the labium majus. It is best treated by incising and dissecting out the sac.

Labial Hernia (inguinal hernia extending into the vulva) is not common. It is treated as in the male, the operation being simplified by the absence of the spermatic cord. It is important to remember that an ovary or even the uterus may be found in the inguinal sac in very rare cases.

Occasionally fibromata or myomata may be found in the round ligament. They are easily removed.

Vascular Caruncle of the Meatus Urinarius.—These growths vary in structure, some being painless, others exquisitely sensitive.

Recurrence after removal is fairly common. At one time they were treated almost exclusively with the cautery point. It is now found that better results are obtained by making a wide excision with scissors and then closing the edges with fine catgut. Before operating it is useful to dilate the meatus a little and to pull down the urethral mucosa with a fine volsellum.

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MALFORMATIONS OF THE VULVA.

ONLY such malformations as come within the range of treatment will be mentioned here.

Atresia Vulvæ Superficialis, otherwise called agglutination of the labia majora, may cause an apparent absence of the vulva, a small aperture being present near the urinary meatus. The adhesions are easily broken down. The vulva may be first painted with 20 per cent. solution of cocaine and the labia are then separated with a probe. At the same time the prepuce should be fully retracted, any adhesions present being broken down. Adherent prepuce is often found alone, and it is desirable to rectify this in all cases, for an accumulation of smegma causes local irritation. It is desirable that a careful examination should be made of the external genitals of every female infant. The passage of a probe into the vagina will negative the presence of imperforate hymen.

Atresia Ani Vulvalis is a congenital defect in which the rectum opens into the vulva. The anus may or may not be absent from its normal position. When there is incontinence of fæces an operation should be attempted, but it is not much use trying before the age of puberty, and as the sphincter is largely absent the task of making one is not very hopeful. Those who have a case to deal with may consult an article by Buckmaster.¹

Atresia of the Hymen, as the condition is usually, though not quite accurately, called, would be a very simple matter if discovered before puberty. The hymeneal ring must be excised and the edges stitched over all round with a continuous catgut suture, and care must be taken to guard against subsequent contraction by occasional examination and passage of a suitable dilator.

When there is menstrual retention, this must be evacuated with strict antiseptic precautions by a free incision and the operation then completed as above. After evacuation the vaginal walls are lax and the uterus is probably patulous; on inspiration there is aspiration of air. Daily irrigation with dilute antiseptic lotion must be continued till all discharge has ceased, the patient being kept propped up in bed for a week or more. Most cases will do well unless there is also hæmato-salpinx, but if the tubes are dilated they empty very badly into the uterus and are apt to become septic.

Such cases are best treated by salpingectomy, if the dilated tubes are palpable after the uterus and vagina have been emptied.

The removal of the tubes matters but little, for they are very unlikely to become functionally active after having been the seat of hæmato-salpinx.

When there is no vaginal opening and no accumulation of secretion, the vagina being undeveloped and the uterus also rudimentary, there is very little use in attempting to form a vagina. Such an operation is very unsatisfactory, and an artificial passage will almost certainly close again.

Occasionally the clitoris is hypertrophied, and sometimes when it is causing inconvenience through becoming sore and irritated it may be well to remove it. The nymphæ also may be inconveniently elongated. Sometimes remnants of hymen form bands of tissue which are an inch or more long, and sometimes loops of mucous membrane which have become stretched are observed at the vulval entrance, and these may be removed to prevent local irritation. Occasionally one is asked if any local measures can be advised to cure the habit of self-abuse, and then the removal of any such obvious abnormality may be indicated. Under the same circumstances the freeing of an adherent prepuce is desirable, and occasionally clitoridectomy may be indicated. I have seen very few such cases, however, and should not like to convey the idea that I judge it to be anything more than a very exceptional necessity.

J. B. HELLIER.

REFERENCE.

- ¹ Buckmaster, A. H., Trans. Amer. Gynecol. Soc., Philad., 1904, XIX., p. 275.

MALIGNANT DISEASE OF THE VULVA.

Epithelioma is common in the external genital organs of the female. It runs a rapid course and is very liable to return early in the seat of operation and in the lymphatic glands. The relief obtained by operation is very great while it lasts, and by a thoroughly radical operation, designed on the lines of the modern operations for carcinoma mammæ, better results are obtainable than were seen formerly.

The disease may start in the labia majora or minora, in the prepuce or clitoris, and may involve the mons veneris, the perineum or urethra. If the urethra is involved, the difficulty of satisfactory radical operation is greatly increased, but about three-quarters of the urethra can be excised without causing incontinence of urine. I will describe the operation for removing a growth that has not reached the neck of the bladder.

Both the glands and the vulval growth should be removed at one operation, and it is best to begin with the glands. The patient lying on her back with the legs extended, both groins are cleared as follows: Make an incision from the outer end of the groin along the line of Poupart's ligament to the upper end of the vulva. Make a second incision, starting from the same point as the other but running below it, so as to include a flap of skin about 2 inches wide and ending just below the first incision. Carry both incisions down till the deep fascia is exposed and then dissect the flap of skin inwards, removing the glands and all the tissues involved in the flap. Several veins require ligaturing, including the external saphenous vein. The glands at the saphenous opening must be carefully removed. The line of the saphenous vein may have to be followed downwards a little to take some other glands. The incision is now closed except the inner end. It is well to draw the deep parts together with buried catgut, to close any potential cavity, and then pass silkworm-gut sutures through the skin. Clear the opposite side in the same manner, cover the groins with dressings, and place the patient in the lithotomy position.

According to the position of the growth an incision is marked out in the vaginal mucous membrane. If the whole vulva requires excision, the inner incision surrounds the introitus vaginæ and the urethral meatus, but passes below the clitoris. An outer incision

divides the skin all round the vulva, leaving an ample margin of healthy tissue. When this outer incision has been carried down to the deep fascia, it is easy to remove the tissues between the outer and inner incisions, but the clitoris will have to be divided or the crura detached from the bone. The whole mass of tissue is now removed with the flaps from the groins if these have not been cut off previously.

The urethra now lies loose just under the pubic arch and can be drawn out a little. At this point, if the lower part is invaded by new growth, the urethra must be cut away sufficiently to obtain a clear margin, for if any is left here the disease will grow quickly from that point.

The vessels during the foregoing dissection are clamped or tied as they are cut. The plexus of veins near the clitoris will require careful attention and may be underpinned with a needle and suture. When all vessels have been secured, the urethra is fixed in the upper angle of the vulval opening. The vaginal mucosa is stitched to the skin all round. The inner ends of the inguinal incisions and the skin edges above the vulva are coapted and sutured. I think it is a good plan to leave rubber drainage tubes along each groin, emerging just above the vulva, to prevent collection of serum and blood under the flaps of skin.

The wounds are now dressed and pressure applied with a spica bandage. Sometimes the wounds heal without any trouble; sometimes there is some sloughing of the skin in the groins, especially if the flaps have been undermined and their vascular supply interfered with. But one must not fear to remove as much skin as may seem desirable, for if an uncovered area is left, granulation together with skin grafting will make it good in the long run.

When healed, the vulva looks like the atrophic vulva of an old woman.

Sarcoma Vulvæ is very malignant, being often melanotic. Radical operation by excision should be undertaken in early cases. Treatment by Coley's fluid may be tried in inoperable cases.

J. B. HELLIER.

PRURITUS VULVÆ.

Pruritus Vulvæ is the name of a symptom rather than of a disease, but it is convenient to discuss the symptomatic treatment, because the pruritus is often present as a highly intractable condition for which the practitioner can find no definite cause. We give here a large number of different formulæ, and this unfortunately means that no one of them can be relied on as a specific, and that, while they all may give great temporary relief, their effect may sooner or later be lost.

The first indication is to seek for any constitutional cause, such as gout, diabetes or pregnancy. The next is to make a thorough local examination. Place the patient in the "lithotomy" position in a good light, examine the vulva and the mons veneris for eczema, scabies, pediculi, or for any lesion of the mucous membrane, such as enlarged follicles, hypertrophied carunculæ, etc. The parts are often found scratched by the patient or sodden with lotions. Try to obtain from the urethra or follicles a drop of pus to examine for gonococci. The rectum and anus must be examined and search made for threadworms. The vagina must be explored for retained pessary, etc. The labia uteri should be examined for adenoid hyperplasia (granular erosion), for this is a common source of copious leucorrhœa, and its cure will arrest the discharge.

The patient may gain something by avoiding highly seasoned and stimulating articles of diet, sugar and acid fruits, and especially alcohol. The effects of a vegetarian diet may be tried. It is very important to avoid constipation and portal congestion, and for this purpose saline purgatives and mineral waters, such as Carlsbad, Æsculap and the like, are useful. Great importance should be attached to improving the general health (*see also* the last section in relation to gout, etc.).

Drug treatment is not very effective for this condition, but very great benefit is sometimes obtained from chloride of calcium taken in doses of from 20 to 40 gr. three times daily in water, which may be flavoured with syrup of lemons.¹ I have known this to be very successful in pruritus vulvæ.

Benefit is said to have been obtained from bromides and arsenic and also from salicylate of quinine. Various sedatives have been given to procure sleep, but the danger of establishing a drug habit

in such a chronic disease is obvious. When the disease comes on at the menopause, it may pass away in time with the other climacteric symptoms.

Local Treatment.—Since the disease is made worse by scratching it is very important that this should cease, but the only way to secure cessation is to find something to relieve the itching. Hot douching, sitz baths and bathing with alkaline lotions are useful, as are also salt baths. Lead lotion combined with opium is one of the most generally useful applications (17) [*see* p. 529]. Preparations of carbolic acid, which combine antiseptic and anæsthetic properties, are often useful. We give a formula by Ravolgi which causes smarting at first but relieves the itching (18); a sensation of smarting is even grateful after long-continued itching. Liniment of belladonna may be used for the same purpose, or painting with tincture of iodine or a 10 per cent. solution of nitrate of silver.

Mercurials sometimes give relief, such as blue ointment or calomel ointment, or oleate of mercury and oleate of mercury with morphia. The anæsthetic effects of essential oils render them useful, and oil of cloves or menthol are examples of such. Menthol may be used in the form of menthol "cone," as sold in the shops, or may be dissolved in oil of almonds in the strength of 1 drachm in 1 oz. of oil. Thymol (10 per cent.) in vaseline is a similar remedy. Another remedy for causing smarting followed by anæsthetic effect is chloroform (1 drachm) in almond oil (1 oz.). A solution of chloral hydrate (10 gr. in 1 drachm), or cocaine hydrochlorate (10 per cent. in glycerine), gives temporary relief, and we also give a formula by Tanner which combines some old remedies (19).

Ruge² and others advise the thorough cleansing of the vulva with removal of the epithelium. For this purpose the patient should be anæsthetised, the pubes shaved and the parts scrubbed with soft soap and a brush, in order to remove all epithelium, but without causing bleeding. The effect is enhanced by at once painting the surface with a solution of nitrate of silver (20 per cent. or even stronger).

The continuous galvanic current has been found useful in very obstinate cases.³ The anode is placed in the vagina and the cathode, covered with wash-leather and well-moistened with salt solution, is passed all over the affected area without breaking the current. The sitting lasts about ten to fifteen minutes with about 20 milliampères of current, or as strong as the patient can bear it. In a case reported by Chalmogoroff five sittings in about two months sufficed to cure.

In otherwise incurable cases recourse may be had to the knife, for the intolerable distress caused by incessant itching has sometimes driven patients to self-destruction. Schroeder, in 1884, originated the plan of excising the vulval mucosa and stitching the mucous to the cutaneous edge. Even this is not invariably successful, and Hirst, of Pennsylvania, has obtained cures by dividing with partial excision the sensory nerves which supply the part. The nerves in question are the genital branch of the genito-crural and the ilio-vaginal on each side, the inferior pudendal branches of the small sciatic, the dorsal nerve of the clitoris, and the cutaneous branches of the pudic. He made an incision in each groin and in each buttock.⁴

J. B. HELLIER.

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- ¹ Savill, T. D., Brit. Med. Journ., 1896, II., p. 732.
- ² Ruge, P., Zentralbl. f. Gynäkol., Leipz., 1896, XX., p. 481.
- ³ Chalmogoroff, S., Zentralbl. f. Gynäkol., 1891, XV., p. 612.
- ⁴ Hirst, B. C., Amer. Medicine, Philad., 1903, V. p. 785.

SYPHILITIC AFFECTIONS OF THE VULVA.

THE vulva is the chief site of syphilitic inoculation in women, but it is often very difficult to obtain any history of a primary sore even when there has certainly been infection. Sometimes the primary sore presents very little induration, and is easily mistaken for a trivial lesion.

The chief mistake made in treating syphilis is deficient duration of constitutional treatment. This is often the patient's fault, for when local soreness has been cured she will not trouble to come for further treatment.

I cannot improve on the directions laid down by Sir Jonathan Hutchinson for constitutional treatment.¹

Mercury is to be commenced as soon as the disease is recognised, and the sooner the better. The following formula is recommended :
R. Hydrargyri cum Creta, gr. 1; Pulveris Ipecac. Comp., gr. 1
 [U.S.P. *R. Hydrargyri cum Creta, gr. 1; Pulveris Ipecacuanhæ et Opii, gr. 1*]. To make one pill.

One pill is to be taken three times daily after meals. The dose must be increased after a while as the patient is able to bear it, and the prescription is to be taken for a year without intermission. It is best to forbid all fruit and green vegetables and soups. Should the bowels be irritable, the amount of pulv. ipecac. co. [U.S.P. Pulv. Ipecac. et Opii] may be doubled. If there is great debility, 1 gr. of quinine may be added. Nothing is better than this form of mercury, and it is a mistake to substitute vapour baths or inunction. There is no real advantage in intra-muscular injection as a means of administration of mercury. Moreover, patients are apt to tire of coming for injections, and so the constitutional treatment is abandoned by them.

For tertiary conditions potassium iodide is the remedy. When the above drugs are not well borne, do not discontinue but reduce the dose until they can be tolerated.

For chancroid and local secondary ulcers, iodoform is the best treatment. Local application of acid nitrate of mercury will often greatly assist the cure of such local conditions.

When the vulva is covered over with exuberant specific warts and condylomata, these may be snipped off with scissors and acid nitrate of mercury applied to the base of each.

In tertiary enlargement of the vulva with hypertrophy of the labia removal of the parts with the knife may be needed in addition to the constitutional treatment appropriate at that stage. In cases of pregnancy where it is desired to protect the fetus from syphilitic infection, one of the above pills should be taken three times daily during the whole period of gestation.

Hutchinson lays down the rule that no one should marry within two years of the beginning of the disease. If at a time later than this marriage should be contemplated, a further course of mercury should be taken.

Ehrlich's specific remedy, Salvarsan or "606."—The place of this remarkable agent in Gynæcology is not yet worked out. Syphilitic lesions of the vulva offer a specially suitable field for making observations on its powers, in primary, secondary or tertiary lesions. During the treatment local antiseptic applications should not be omitted, and in tertiary lesions iodide of potassium may also be required.

J. B. HELLIER.

REFERENCE.

¹ See Hutchinson, Sir J., F.R.S., "Syphilis," new edit., 1909, Chap. I., pp. 506—13.

VARIX AND HÆMATOMA OF THE VULVA.

Varicose Veins are often seen in the vulva, especially in pregnancy, and sometimes they reach an enormous size, and even occasionally rupture. I have seen a patient in the last month of pregnancy who died in the street from this cause. I have also removed during pregnancy a single prominent vulval vein, the condition of which seemed dangerous, but usually the enlargement, when dangerous, is so widely diffused that one can only recommend confinement to bed till labour is over, with support by spica bandages.

Hæmatoma is the result of subcutaneous rupture of such a vein. It is usually only seen in labour or after a blow. Rest, cold and pressure suffice for treatment in most cases. Only occasionally, when septic changes threaten or labour is obstructed or rupture imminent, it is necessary to make an incision and turn out the clots, arresting hæmorrhage with ligatures, deep sutures and pressure.

J. B. HELLIER.

VULVITIS AND FORMS OF DERMATITIS AFFECTING THE VULVA.

With the exception of gonococcal vulvitis, which we shall discuss separately, inflammation of the vulva is usually readily amenable to treatment. First determine the cause and deal with the source of irritation as described in the last section.

Seek for any constitutional cause. Treat constipation and deplete the portal system if indicated. In gouty patients we often have to try change of air or, to be more correct, change of environment, in order to get a cure. Send the patients to where it is high and dry, let them have exercise enough to make them perspire freely, let them be restricted in any kind of food they have been taking to excess, let them avoid alcohol altogether, drink aperient mineral waters, bathe systematically and use the local treatment here indicated, and cure may be expected. Remember to test the urine for sugar.

For local treatment lotion of borax is useful (3ij to Oj) and the glycerine of borax [U.S.P. R. Sodii Boratis, 14·25; Glycerini, 85·50] is of special value. The preparations of lead are some of the most effective remedies we have for local inflammation of this sort (Formulae 15, 17), and the ointment of glycerine of lead is serviceable. When *eczema* or *herpes* is present avoid strong applications, such as strong zinc ointment, etc. Use boric acid ointment or its combination with liquor picis carbonis (Formula 20), Ravogli's formula for ichthyol liniment (21) or Anderson's for bismuth oxide ointment (22).

For the more chronic cases the ointment of ammoniated mercury is useful. When parasites are present, this same ointment may be used and it may be combined with stavesacre (23).

There is a form of vulvitis called *follicular* in which inflamed distended follicles are scattered over the vulva. These may be punctured and the parts dressed with lead lotion or with one of the ointments already mentioned.

Infection of the vulva by the thrush fungus is not a serious condition, and is quickly cured by the use of such antiseptics as sulpho-carbolate of zinc (8) or biniodide of mercury (11).

Diphtheria may affect the vulva and cause severe local

inflammation, which in young and cachectic subjects may lead to local necrosis. General symptoms may be very severe, although vulval diphtheria is less serious than that of the respiratory tract (*see* Diphtheria, Vol. I). Antitoxin with local antiseptics, but without caustic applications, is the treatment indicated.

Erysipelas Vulvæ is now uncommon, but is occasionally met with apart from puerperal conditions. It may be very serious, causing itching, burning, redness, œdematous swelling, pain, vesication, abscess in the cellular tissue, and constitutional symptoms of corresponding severity. (For treatment *see* that of Erysipelas, Vol. I.) The local treatment is by warm local antiseptic dressings, with exclusion of air as for a burn. Carron oil with carbolic acid (2 per cent.) is useful for this purpose.

Constitutional treatment by anti-streptococcus serum may be recommended, provided that there is not an unopened abscess.

Gonococcal Vulvitis.—Multiplicity of lesions is a prominent characteristic of gonococcal infection in women. Vulvitis is one of the commonest and earliest of these, and is not in itself very serious or difficult of cure, but the ascent of the infection to the uterus, oviducts, ovaries and abdominal cavity is the cause of chronic inflammatory affections which are amongst the most troublesome conditions that the gynæcologist has to treat. The lesions caused by gonorrhœa include urthritis, cystitis, vulvitis, with infection of the ducts and glands of Bartholin, vaginitis, cervicitis, endometritis, salpingitis, ovaritis, peritonitis, cellulitis, and metastases, as in the male; the anus and rectum are also liable to share in the infection.¹ The writer has given a detailed account of the subject elsewhere, and may perhaps be permitted to refer the reader to this for a discussion of much that falls beyond the scope of this paper. But the treatment of gonococcal infection of the genital canal may be considered here at some length.

General Measures.—The great desideratum is to obtain prompt cure of the earliest lesions, in order to prevent infection of the uterus and its adnexæ. Except in the practice of Lock Hospitals, acute recent gonorrhœa relatively seldom comes before the gynæcologist for treatment in proportion to cases of chronic disease. In these the germs are attenuated in virulence, but obstinately lodged in the recesses, glands and follicles of the complex female genital tract.

Rest is a most important element in cure. Experience in military practice has shown that if men with acute gonorrhœa are confined to bed at once the disease is far more amenable to early cure. Women should be treated if possible in the same way. Rest is especially important at the menstrual periods.

Coitus must be forbidden, for nothing tends more to cause extension of infection than continued intercourse with an infected male. It is obvious also that *both* husband and wife must be cured or one will reinfect the other.

The indications for cure are often best obtained by admitting the patient to a nursing home or hospital where the whole environment is under control.

In acute cases and in those where there are pain and pyrexia with threatening of abdominal complications, low diet is indicated, but in those with the impaired nutrition which accompanies this infection good food with tonics is needed. Alcohol is best avoided in all stages. Care must be taken to clear the bowel from faecal accumulation and to prevent constipation.

The external parts must be kept clean and must be disinfected with lotions of biniodide of mercury, or lysol, or the like. The hairs may be removed and frequent baths employed. Vaginal discharges must be received on suitable pads which are to be systematically removed and burned, remembering the infectious nature of the discharges and the danger to the eyes of the nurse as well as of the patient. This must be especially remembered in the case of young children with vulvo-vaginitis. The rectum is sometimes infected by introducing into it a finger or enema syringe nozzle, which has been infected in the vagina of the same or of another patient. Clinical thermometers have also carried infection from one rectum to another.

It is very doubtful if drugs have any specific action on gonorrhœa in women. They may act to some extent on the urinary tract, but rather by lessening catarrh than by killing the diplococci. For dysuria such a prescription as the following may be given: R. Potassii Bicarb., gr. 20; Tr. Hyoseyami, m30; Extr. Glycyrrhizæ Liq., m30; Inf. Buchu, ad 3j.

Sandalwood oil and gonosan are said to have slight germicidal power in the urinary tract.

Local Treatment—There are three possible lines of treatment for gonococcal infection of the female genital canal. First, there is the so-called *abortive* treatment. This aims at cutting short the disease by early use of strong germicidal agents, such as strong carbolic acid or strong solutions of silver salts, of which the organic silver compounds are the best. Quite early in the case some also dilate the cervix, use the curette and then apply the caustic. There is a very general consensus of opinion that this method does, on the whole, more harm than good, for it is not possible to destroy all the germs, and those that remain seem to multiply all the faster by

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reason of the inflammatory reaction that is set up. We especially advise against the use of the curette in early stages. Moreover, such local interference in the acuter stages is likely to favour the "ascension" of the disease.

Secondly, we may postpone local treatment until the subacute or chronic stages, and it is indeed in such stages that the majority of infected women are first seen. Here we may use local applications with due care and moderation.

Vaginal irrigation with medicated solutions is the first remedy that occurs to the practitioner. While such are to be avoided in the acute stage, they may be used later provided that their strength is not too great, that due provision is made for a return current, and that they are given from a douche can which is elevated only just enough to cause a gentle flow. Some would abandon their use altogether and simply swab out the vagina with tampons on holders, but this needs skilled attendance at each application, and is unsuitable for poorer patients. Permanganate of potassium in pale claret-coloured solution, biniodide of mercury (1 in 3,000) and carbolic acid (1 per cent.) are suitable for the purpose. A plain warm water injection may precede the medicated douche. Medicated vaginal suppositories of iodoform may be placed in the vagina after the douching, when the patients are staying in bed.

The preparations of silver which are so useful in dealing with gonococcal ophthalmia are useful here. The organic preparations have the advantages that they do not precipitate chlorides or coagulate albumen. Argyrol, the strongest of these, contains 30 per cent. of silver; protargol contains 8 per cent.

In examining an ordinary chronic case of gonorrhœa in a good light, little reddened follicles of the size of a pin's head or less are commonly seen scattered round the meatus urinarius, on the labia minora and on the myrtiform caruncles. Pus can often be squeezed out of these, and gonococci are found in them. Such points can be punctured and painted with a 20 per cent. solution of argyrol in glycerine, and this same solution can be used to swab the urethra and the whole vagina and cervix. The orifices of Bartholin's ducts can be treated with argyrol on a fine wooden probe.

When the vaginal portion of the cervix shows adenoid hyperplasia, giving the well-known granular looking patch misnamed "erosion," it is important to destroy the gland tissue. This can be done efficiently by the application of fuming nitric acid, using a glass cylindrical speculum for the purpose, or the patch can be scraped away by a sharp spoon, or destroyed with the thermocautery. The cure of this granular area immediately lessens the

leucorrhœal discharge and removes a favourite haunt of the diplococcus. Nitrate of silver is a very unsatisfactory application for such a cervix. After scraping, paint with strong carbolic acid or argyrol.

Thirdly, in view of the unsatisfactory results of treating chronic gonorrhœa by the older methods, the gynæcologist turns with interest and hope to the biological agents now available.

The growth of the *yeast* plant destroys the gonococcus and also other micro-organisms, and can be thus used in the treatment of gonorrhœa.² This has the advantage that it can be used in the acutest cases without fear of causing ill-effects. The yeast to act effectively needs to be mixed with a little sugar. It is introduced into the vagina through a small speculum, the patient being kept in bed. The yeast is renewed in twenty-four hours, the vagina being wiped dry with a mop of wool first but not irrigated with a douche.

After six applications, douche thoroughly with solution of permanganate of potassium, and then wait to see what secretion comes by next day and test for gonococci.

There is no doubt that this treatment destroys the gonococci in the vagina, but how far it can overtake the gonococci that have penetrated in the recesses of the glands and follicles where the most chronic infection lies remains to be seen. But it is a great help thus to be able to neutralise those that are in superficial positions. A. Martin has treated with success the gonorrhœa of pregnancy with yeast.

The *lactic acid bacillus* can also be used for the same purpose. Reference may be made to a paper by Mr. Beckwith Whitehouse,³ and to another by Dr. David Watson of the Glasgow Lock Hospital.⁴

Both these are of the nature of preliminary communications. Mr. Whitehouse has used a broth culture and Dr. Watson a preparation made by the Glasgow Dairy Company. I have used soured milk which has been prepared in the ward every two days with sauerintaboids. We have introduced into the vagina a small packing of gauze dipped in the culture, and have renewed it every second day.

There seems to be no doubt that this treatment quickly lessens the discharge and destroys the gonococci. Here, also, we cannot yet state how far it will avail in chronic cases where the gonococci have reached the remotest crevices of the genital canal. It can hardly be expected to reach the oviducts.

Treatment by Vaccines.—The treatment of gonorrhœa by vaccines

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is discussed elsewhere (*see* Vol. III.). It seems to promise a method of reaching the diplococci when they elude local treatment and to supply a desideratum long sought. We may thus hope to deal even with the gonococci in the oviducts and peritoneal cavity. Of course, we cannot expect the treatment to remove all the consequences of the inflammatory action excited by the diplococci.⁵

The following points must be borne in mind : The treatment is not suitable for the out-patient department. It is well to have the patients under constant observation and to keep them in bed. Also, it is rather costly at present.

It is not always necessary to use a vaccine prepared from the patient's own discharges, and treatment may be commenced with a vaccine supplied from a reliable firm.

It should be used in relatively small doses, say 1,000,000.

This may be supplemented by a vaccine prepared from the patient. Treatment must be checked by bacteriological observations. It must be persevered in till the patient is cured, and only repeated observations can give this assurance.

Vulvo-Vaginitis in Children.—This is almost always caused by local infection, and the germ is usually, though not invariably, the gonococcus or a diplococcus closely resembling it. The infection is conveyed by fingers, sponges, unclean vessels, clinical thermometers placed in the anus or vagina, or by similar means. Rarely need any criminal act be suspected. It will be well to enquire concerning any cases of infectious discharges in the same house, for a child has been found with gonococcal vulvitis when the mother had infective leucorrhœa.

Many of the cases clear up if the parts are washed twice daily and irrigated with solution of permanganate of potassium in pale-claret coloured solution or with biniodide of mercury (1 in 2,000). When the acute stage has passed off, the vagina may be wiped out with 5 per cent. solution of argyrol on a Playfair's probe. Small bougies of iodoform and cocoa-butter have been used with success by insertion in the vagina.

Treatment by the bacteriological methods and vaccines as already described is applicable to children. It is very desirable to keep them in bed to assist cure, for occasionally the gonococcal infection ascends to the uterus and peritoneum, and causes trouble immediately or at a later period by setting up inflammatory changes, and some of the cases of primary dysmenorrhœa observed at puberty may be due to this cause.

Care must be taken to destroy all discharges and soiled dressings,

and to take precautions against the conveyance of infection to the eyes.

J. B. HELLIER.

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- ¹ In the last edition of Allbutt, Playfair and Eden's "System of Gynæcology", 1909, pp. 562, 675, 680.
- ² See Abraham, Otto, "Zur Hefetherapie der weiblichen Gonorrhöe," *Zentralbl. f. Gynäkol.*, Leipz., 1904, XXVIII, p. 249.
- ³ *Practitioner*, 1910, LXXXIV., pp. 485—500.
- ⁴ *Brit. Med. Journ.*, Lond., 1910, I., p. 192.
- ⁵ Reference may be made to a valuable article by Eyre, J. W. H., and Stewart, B. H., in the *Lancet*, Lond., 1909, II., pp. 76—81, on the treatment of gonococcal infection by vaccines.

APPENDIX OF FORMULÆ.

Dusting Powders for Vulvitis and Intertrigo:

1. R. Pulveris Amyli, Zinci Oxidi, āā partes æquales.
2. R. Pulveris Amyli, Acidi Borici, āā partes æquales.
3. R. Bismuthi Subnitratis, partes 2; Acidi Borici, partem 1.
4. Purified Fuller's Earth is also very effective.

Vaginal Injections.—These are best administered by gravity with a douche can, a tube with a stopcock and a glass vaginal tube. The patient should lie in the horizontal position over a bed-pan or bed-bath. The injection should be continued for ten minutes or more, and an ample quantity should be used. The following are some of the most useful, with the quantity to be dissolved in one pint of water.

5. Carbonate of Potassium or Sodium, ʒj to ʒiij (simple alkaline injection).
6. Borax in powder, ʒj to ʒiij (alkaline and sedative).
7. Sulphate of Zinc, ʒss to ʒj (astringent).
8. Sulphocarbolate of Zinc, ʒj to ʒij (astringent and antiseptic).
9. Alum, ʒj to ʒij (astringent).
10. Tannic Acid, ʒj; Alum, ʒij (strongly astringent).
11. Biniodide of Mercury, 1 in 3,000 to 1 in 2,000 (germicidal and less likely to cause symptoms by absorption than bichloride, which must be used in dilution of 1 in 4,000 to 1 in 3,000).
12. Carbolic Acid. This seems to be as useful as any drug for deodorising offensive discharges. Use in dilution of 1 or 2 per cent. and employ an ample quantity. Jeyes' Fluid, a teaspoonful to the pint, answers well. Lysol (ʒij to ʒiv in 1 pint) may be used.
13. The B. P. Solution of Peroxide of Hydrogen (10 vols.) in 10

to 20 per cent. dilution is a good disinfectant and deodoriser. So is Sanitas fluid in third or quarter strength.

14. Formaldehyde, 1 in 5,000 (deodorant).

Lotions for Vulvitis, Pruritus, etc.:

15. Lead Lotion. *R.* Liquor. Plumbi Subacetatis Diluti (to be used in single strength or diluted).

16. *R.* Liquor. Plumbi Subacetatis (strong solution), ʒj; Glycerini, ʒj; Aquam Rosæ, ad Oss.

17. Lead and Opium. Add to either of the last two of Tincture of Opium, ʒjss [U.S.P., ʒijss] to Oss.

18. Carbolic Lotion (Ravogli). *R.* Acidi Carbolici, ʒj; Glycerini, ʒij; Spiritus Vini Rectificati, ʒij; Aquam Rosæ, ad ʒij.

19. Tanner's formula for pruritus: *R.* Liquor. Ammonii Acetatis, ʒjss; Acidi Hydrocyanici Diluti, ʒjss; Infusum Tabaci, ad ʒviij. Make a lotion; to be labelled "poison."

Ointments for Eczema Vulvæ, etc.:

20. *R.* Liquor. Picis Carbonis, ʒj; Unguent. Acidi Borici, ʒj.

21. *R.* Bismuthi Oxidi, ʒj; Acidi Oleici, ʒj; Ceræ Albæ, ʒiij; Paraffini Mollis, ʒix. (Anderson's formula for eczema with pruritus.)

22. *R.* Ichthyol, ʒij; Olei Amygdalæ, ʒiv; Liquoris Calcis, ʒiv; Glycerini, Aquæ Rosæ, āā ʒj. (Ravogli's ichthyol liniment.)

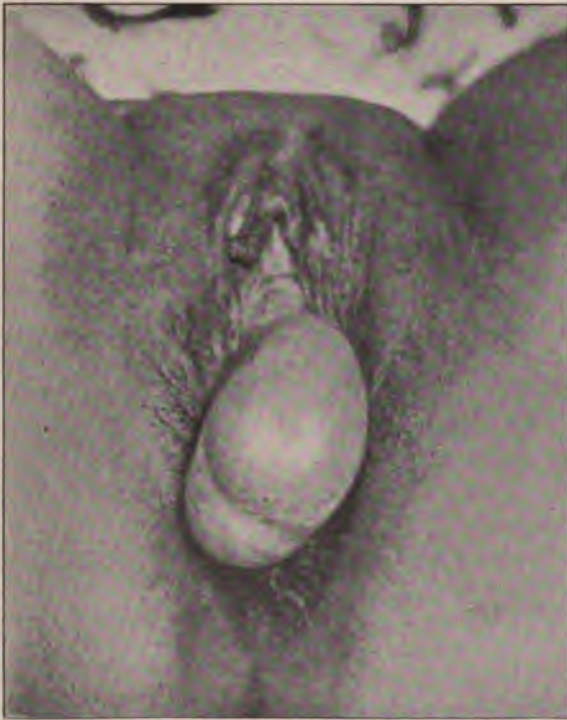
23. *R.* Unguenti Hydrargyri Ammoniati, Unguenti Staphisagriæ, āā partes æquales. (Parasiticide Ointment.)

J. B. HELLIER.

DISEASES, AFFECTIONS AND INJURIES OF THE VAGINA.

CYSTS OF THE VAGINA.

VAGINAL CYSTS which cause inconvenience should be removed by enucleation. The vaginal wall covering the cyst is freely incised in a situation where it is not adherent to the cyst wall. Enucleation



Vaginal cyst hanging outside vulva.

is then carried out by blunt dissection, keeping close to the cyst wall in order to avoid unnecessary bleeding and possible injury to the ureter. If the cyst is ruptured in the process the completion of the enucleation is greatly assisted by packing the cyst cavity with gauze or lint, and so defining its extent and contour. There is

generally a good blood supply, and one or more arteries often demand ligature. The bed of the cyst is sometimes of surprising depth and extent. It should be closed by buried sutures of unhardened catgut, inserted so as to check bleeding. Redundant portions of the vaginal wall should be cut away and the cut edges should then be united by catgut sutures in the most convenient direction.

The vagina may be packed with gauze for twenty-four hours to check oozing and to prevent the collection of blood clot in the depth of the wound.

Occasionally there is difficulty and risk of injury to the ureter in completing the enucleation of a large vaginal cyst. It is then permissible to cut away as much of the cyst wall as can conveniently be removed, together with redundant portions of the vaginal wall. The cut edge of the remaining portion of the cyst wall may then be sutured to the cut edge of the vaginal wall, so that the remaining part of the cyst-lining comes to form a part of the vaginal wall.

In dealing with cysts between the urethra and the vagina it is useful to keep a sound or dilator in the urethra during enucleation. If, in spite of this precaution, the urethra is opened, the rent should be sutured with fine catgut, which is buried as the bed of the cyst is closed.

W. E. FOTHERGILL.

FISTULÆ OF THE VAGINA.

Vesico-Vaginal Fistulæ.—As a preliminary to operative treatment the bladder and the vagina must both be rendered healthy. This may demand rest in bed for a considerable time. Phosphatic deposits may require removal, and the vagina and bladder may need douching with mild antiseptic solutions. Light packing with gauze or lint may be desirable, and the use of cocoa-butter pessaries, medicated with iodoform or boracic acid, may be of advantage. It may also be necessary to modify the composition of the urine by the administration of appropriate drugs, and to dilute it by ordering copious draughts of water, aerated waters, barley-water or natural lemonade. Operative interference should not be undertaken until both the tissues and the urine are normal. The size, shape and position of vesico-vaginal fistulæ vary so widely that it is not possible to describe any method of operating which is of general application. Each case must be treated upon its merits. It may be stated, however, that no tissue should be removed by paring away the edges of fistulous openings. Splitting the margin of the fistula all round and separating the vaginal wall from the bladder wall is the basis of most modern methods. The rent in the wall of each viscus is sutured separately, the stitches placed in the bladder wall being buried when the breach in the vaginal wall is closed. There should be no tension upon any of the stitches.

A good and widely available method is the following: Encircle the fistula by an incision through the vaginal wall made at a distance from the fistulous opening equal to half its diameter. With scissors separate the vaginal wall from the bladder wall, working inwards from the incision, and taking care as the margin of the fistula is approached to avoid cutting through the scar tissue surrounding it. Turn the ring of vaginal wall so separated inside out, so that its vaginal surface faces the bladder and fills up the aperture. Unite the inturned edges of vaginal wall with fine catgut sutures, avoiding puckering as far as possible. Then close the raw surface facing towards the vagina with sutures of stronger catgut. A continuous suture prevents leakage better than a number of interrupted sutures.

In order to avoid tension, incisions may be made through the

vaginal wall at a safe distance from the fistula. These may be allowed to granulate, or they may be closed in lines at right angles to their original direction, or they may be sutured so as to leave triradiate or "leechbite" scars. At the end of the operation the bladder may be filled with milk in order to make sure that there is no room for leakage between the stitches. A self-retaining catheter should be worn for a few days. So long as any blood appears in the urine the catheter should be removed frequently to be freed from blood clot, and sterilised by boiling before it is replaced.

After an operation of this kind the size of a fistula is generally much reduced, even should success not be complete at the first attempt. When the bladder still leaks, the surgeon should wait until healing is quite complete. He can then repeat the operation with a greatly increased prospect of success.

Fistulæ which open high in the vagina, close to the cervix, may sometimes be closed by the device used for vesico-uterine fistulæ. The anterior vaginal fornix is incised, and the bladder is freely separated from the cervix and also from the vaginal wall in the region of the fistula. The hole in the bladder wall is stitched up, and the cervix itself is then fastened over its situation by sutures which close the vaginal incision.

Some very large vesico-vaginal fistulæ may be treated by colpocleisis, namely, by turning the bladder and the upper part of the vagina into one chamber whose only outlet is the urethra. Coitus is rendered impossible, and in women who still menstruate, the menstrual fluid must escape by the urethra. The operation is thus most suitable for patients who have passed the menopause or whose uteri have been removed.

An incision is made right round the vaginal wall well below the level of the fistula. A collar of vaginal wall is then dissected upwards from the incision. Its edges are then united by catgut sutures and it is turned inside out. The raw surface left is closed from side to side or from back to front, according to convenience. A self-retaining catheter should be used for a few days.

Uretero-vaginal Fistulæ.—These are generally sequels to hysterectomy. If the urine escapes into the vagina from the time of the operation a ureter has probably been cut, but if the leakage begins some days after the operation it is generally due to the sloughing of a portion of a ureter following interference with its blood-supply. If some of the urine which comes down the ureter can enter the bladder, the lower part of the ureter remaining patent, the fistulæ should be closed by a vaginal operation, such as that described under the heading *Vesico-vaginal Fistulæ*.

But if all the urine from one kidney escapes by the vagina, the lower portion of the injured ureter being obliterated by scar tissue, there are two courses open to the surgeon. He can open the abdomen, trace down the ureter, and implant its end either into the bladder or into a convenient portion of the large intestine. Or, if this is impossible, he can remove the kidney corresponding to the injured ureter.

Fortunately the majority of injured ureters heal slowly without surgical treatment. Those which fail to do so demand careful investigation with special appliances, for it is essential that their exact nature and position be understood before treatment is attempted. The details of the various operations which have been devised and tried in these cases cannot suitably be described here.

Palliative Treatment of Urinary Fistulæ.—Fistulæ caused by malignant disease and by active tuberculous disease are unsuitable for operative treatment, which is also contra-indicated in certain other cases owing to the age or debility of the patient. The bags of rubber known as "female urinals" are very useful in cases of this nature. They can be adjusted for nocturnal and for diurnal use, and are easily cleaned by boiling. Patients who cannot afford these bags sometimes keep themselves fairly dry by packing the vagina frequently with tight plugs of cotton-wool smeared with vaseline or some other lubricant.

Fæcal Fistulæ.—As the majority of recto-vaginal fistulæ result from incomplete healing after the repair of complete tears of the perineum, they are generally small in size and are situated low down in the posterior vaginal wall. Many of them actually open in the "anal canal" rather than in the rectum itself. Attempts to repair these openings without cutting through the perineal body present mechanical difficulties, and are seldom followed by success. The proper method of operating is to pass a probe through the fistula and cut down upon it in the middle line of the perineum. The rectal wall should then be separated from the vaginal wall for 1 inch or so above and on either side of the fistula. The scar tissue which forms the wall of the fistulous tract should be cut away. Then the anterior rectal wall should be repaired with sutures of unhardened catgut. The first stitch is placed at the apex of the breech, and the others follow from above downwards. Each stitch is passed from the rectum on one side across the wound and back into the rectum on the other side. Thus the knot is tied in the rectum or anal canal and does not interfere with healing by irritating the wound itself.

The vaginal canal is next repaired in the same manner, and,

finally, the halves of the perineal body are united by stitches of silkworm gut or hardened catgut, which are tied on the perineal surface. After this operation the bowels should be moved on the third day and every subsequent day in order to avoid the formation of hard fecal masses. The passage of the stools may be facilitated by the injection of oil.

Post-operative recto-vaginal fistulæ situated high up on the posterior vaginal wall may be repaired by the method described for vesico-vaginal fistulæ. In order to gain access to them the perineum may be incised at the beginning and stitched up again at the end of the operation.

W. E. FOTHERGILL.

FOREIGN BODIES IN THE VAGINA.

THE first essential is to remove the foreign body, and this is not always easily done, for old pessaries and the like, which have caused ulceration, may be very firmly embedded in the scar tissue. Apart from actual ulceration, the shrinkage which follows the menopause may seriously interfere with the removal of a long-worn pessary. The patient may have to take an anæsthetic, and she should be put in the lithotomy posture in a good light. If necessary, the perineum must be incised, and bands of scar tissue may require division with the knife or scissors. Bone forceps, gas pliers, and other strong tools may be used for breaking up some foreign bodies which demand removal by *morcellement*.

The next part of the treatment consists in keeping the vagina clean and well drained while healing goes on. The patient may have to remain in bed for some days. A mildly antiseptic douche should be given once or twice daily, and light gauze packing may be used to keep apart the lacerated surfaces. Pessaries of cocoa-butter, medicated with iodoform or boracic acid, may be inserted after each douche. Suppurating tracts and pockets may be washed out with peroxide of hydrogen with great advantage.

Thirdly, it may be necessary to repair any damage which may have been done by some plastic operation undertaken after healing is complete. Thus recto-vaginal and vesico-vaginal fistulæ may require repair, scars which cause vaginal stenosis may require division, and perineal lacerations may need attention.

W. E. FOTHERGILL.

INFECTIONS OF THE VAGINA.

THE lining of the vagina contains no glands and no hair follicles, and it has a strong covering of stratified squamous epithelium. Again, the bacillus which is the normal inhabitant of the vagina produces lactic acid to an extent which inhibits the growth of most pathogenic organisms. Thus the practitioner is never called upon to treat the results of infection of the vagina pure and simple. Vaginitis occurs as a complication of injury or of mechanical or chemical irritation of the vaginal epithelium. Its treatment is accordingly discussed under headings such as "Injuries" and "Foreign Bodies." Infection of the vagina also occurs as a secondary result of "infection of the vulva," "infection of the uterus," and "infection of the pelvic connective tissue." In these cases its treatment forms a part of the management of the primary condition.

It should be remembered that in children the vaginal epithelium is much less resistant than in adults, and is more easily involved in the results of septic or gonococcal vulvitis. Thus vaginal douches should not be ordered for children, but sitz baths of mild antiseptic solutions should be employed in their place in the treatment of vulvitis.

At and after the menopause the degenerative changes lower the resistance of the tissues to the attacks of micro-organisms. Thus senile vulvitis and vaginitis are of relatively frequent occurrence, and demand treatment by extreme cleanliness and mild sedative and antiseptic applications. Chemical irritation of the vaginal wall is generally caused by the use of too powerful antiseptics. For example, the vagina is plugged with gauze impregnated with mercuric perchloride or biniodide, which is withdrawn the next day: a few hours later the superficial layer of the vaginal epithelium is found to be separated in the form of one large or several smaller blisters, and comes away, leaving a raw surface which is easily infected. The result is a true infective vaginitis, which gradually passes away under the influence of mild douches.

This leads up to the statement that the preventive treatment of infections of the vagina consists in the avoidance, so far as possible, of local treatment for minor gynæcological troubles.

Vaginal packing, for instance, should not be used without a

definite indication. Glycerine plugs should be employed only when it is desired to favour the removal of inflammatory exudates in the pelvic tissues, that is, during convalescence from acute infective disease.

Vaginal douches should not be used without some real indication, and antiseptic douches should not be used at all unless there are living pathogenic organisms in the vagina.

It should be remembered, further, that under various circumstances the resistance of the vagina to the attacks of micro-organisms is lowered by dilution of the vaginal secretion, which reduces its acidity below the normal standard. Thus during menstruation and the puerperium the acidity of the vaginal content is lessened by the flow of blood and mucus from the uterus into the vagina. The excess of mucus from a congested and overgrown endometrium, either cervical or corporeal, may act in the same way during intermenstrual periods. Mere excess of vaginal secretion has the same effect. Thus leucorrhœa, whether uterine or vaginal in origin, predisposes to infection. The habit of aimless douching indulged in by many women often keeps up a constant leucorrhœa, and washes away the lactic acid which should remain in the vagina.

W. E. FOTHERGILL.

INJURIES OF THE VAGINA.

THE treatment of injuries of the vagina is conducted upon general surgical principles. The preliminary inspection is facilitated by ballooning the vagina with air, and this can be accomplished in two ways. The patient may be put in the Sims position, lying on her side, the lower arm behind the body and the knees drawn up; the knee of the upper leg should rest on the bed or table nearer the chest than the knee of the lower leg. If the perineum is now drawn back with a retractor, air enters the vagina, and a good view can then be obtained of the whole of its surface. Otherwise the patient may be put in the lithotomy posture, and the head of the table may then be lowered until its top makes an angle of from 30 to 45 degrees with the floor. When the perineum is drawn back air enters the vagina as before.

If the injury is seen early, it is generally because there is free bleeding, and the chief object of treatment is to stop the flow of blood. This is done by catgut sutures inserted with curved needles so as to close the wound. If it is likely, from the circumstances, that infection has occurred, room for drainage should be left.

Lacerations which open the pouch of Douglas may be complicated by the protrusion of coils of intestine into the vagina. They should be cleansed with normal saline solution and returned to the abdominal cavity, and should be kept there by plugging the rent in the vaginal roof with plain sterilised gauze, a little of which is passed into the pouch of Douglas. The vagina should also be filled with gauze. The packing should be withdrawn within two days, after which, if the course of events is favourable, light vaginal packing every day for a few days will complete the treatment. If there is any indication that infection has occurred, the pouch of Douglas may be drained by a rubber tube or by a strip of gauze. If the bladder or the rectum is wounded, the rent, after being sutured, should be buried by separate stitches, which draw together the margins of the vaginal wound.

When a vaginal injury is seen only after infection has occurred and suppuration has begun, it should not be stitched at all, but should be cleansed with mild antiseptic lotions and drained by light packing. The dressings should be repeated daily until healing by granulation is well advanced.

W. E. FOTHERGILL.

MALFORMATIONS OF THE VAGINA.

Congenital Malformations. — Incomplete fusion of the Müllerian ducts may leave a median longitudinal septum dividing the vagina into two lateral halves; but as coitus can generally take place on one or on both sides of the septum, treatment is seldom required. If necessary, longitudinal septa may be cut away, the raw surfaces thus produced being closed with catgut sutures in order to check bleeding and to avoid slow healing by granulation.

Incomplete canalisation of the Müllerian ducts produces vaginal atresia. If the uterus and ovaries are normal, this malformation



FIG. 1.—Vaginal atresia. *a*, hæmatocolpos; *b*, hæmatocolpos with hæmatometra; *c*, hæmatocolpos and hæmatometra with hæmatosalpinx.

causes retention of the menstrual fluid, and thus produces symptoms soon after puberty. Investigation then reveals the presence of hæmatocolpos, with or without hæmatometra and hæmatosalpinx.

The commonest form of vaginal atresia is that known as "*imperforate hymen*," in which it is really the lower part of the vagina and not the hymen which is at fault. The treatment consists in making a vaginal outlet between the perineum and the urethral aperture. The anæsthetised patient is put in the lithotomy position, when the perineum is seen to bulge under the pressure of the retained blood and mucus. A transverse incision is made about $\frac{3}{4}$ inch behind the urethral opening. The first stroke of the knife may open the vaginal cavity, or, on the other hand, a considerable thickness of tissue may require division. The chocolate-coloured,

viscid fluid escapes pretty freely at first, but the more sticky portion may have to be washed away with tepid normal saline solution (5j of salt to a pint). The opening should be enlarged and trimmed to admit two fingers with ease. The cut edge of the vaginal wall should then be sutured with catgut to the cut edge of the skin so as to leave no raw surface. As soon as the patient has recovered from the anæsthetic she should sit up in bed all day in order to favour the drainage of the dilated genital tract. In former days this simple operation was very often fatal through septic infection.



FIG. 2.—Diagram of clinical effects of hæmatocolpos in compressing rectum and urethra.

It is, therefore, advisable to use strict aseptic precautions, to make a large vaginal outlet, and to promote free drainage by posture.

In cases of a less common type the whole of the lower portion of the vagina is solid, the vaginal canal being represented only by a small cavity into which the cervix opens. In these cases the retained menstrual fluid distends the uterus (hæmatometra). In order to reach it a careful dissection has to be made between the urethra and bladder in front and the rectum behind. When the cavity has been reached, the tunnel leading to it must be enlarged to admit two fingers, and must be kept open subsequently. If possible, the vaginal wall should be drawn down and sutured to the cut edge of the skin. Otherwise the canal may be kept open with glass dilators until it has become lined by epithelium. The process

is painful and irksome to the patient, who often allows the passage to close, the result being a recurrence of hæmatometra, generally complicated by infection.

In cases of this kind the essential reproductive organs are often defective, and the prognosis as regards the reproductive function is not good. Therefore, when it is found difficult to make a good tunnel from the perineum there is much to be said in favour of giving up the attempt, opening the abdomen and removing the distended uterus by abdominal hysterectomy. This course is probably safer, more pleasant and more certain than the difficult, risky and prolonged treatment by the perineal route which is required when the greater portion of the vagina is solid.



FIG. 3.—Absence of lower portion of vaginal canal.

Sometimes the lower portion of the vagina is patent, the upper portion being solid. In such cases, if there is hæmatometra, the retained fluid is reached by prolonging upwards the existing vaginal canal.

In cases of another class no difficulty is caused by retained men-

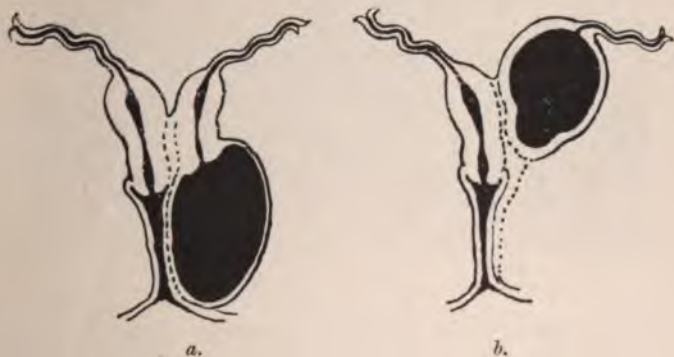


FIG. 4.—Doubling of uterus and vagina with (a) hæmatocolpos, and (b) hæmatometra.

strual fluid, the essential reproductive organs being so defective that menstruation does not occur at all. The only treatment possible thus consists in the construction of an artificial vagina for purposes of coitus. This is sometimes desired and attempted. A dissection is made between the bladder and the rectum, and is kept

open by means of glass dilators. Attempts have been made to line the new vagina with flaps of skin from the external surface. They are cut from the lateral aspects of the vulvar cleft. One is left attached in front, and is used for lining the anterior wall; the other is left attached behind, and is used for covering the posterior wall of the canal. The cases recorded are too few to permit of any definite conclusion as to the value of operations of this kind.

The above lines of treatment are applicable to cases of vaginal atresia combined with doubling. Thus hæmatocolpos in one side of a double vagina requires only incision and drainage. But in a case of double uterus and double vagina one vagina may be solid, the corresponding uterus being distended (hæmatometra). In such a case treatment of the solid vagina is not attempted, but the distended half of the uterus is removed by the abdominal route.

Acquired Malformations.—Occasionally, after injuries, the vagina is deformed by the contraction of cicatricial tissue, which may cause obstruction during subsequent parturition. Bands of scar tissue soften and stretch in a remarkable manner during labour, but they may require division with the knife or scissors. The incisions may thereafter be allowed to heal by granulation. Deformities of this nature are not treated before parturition unless they prevent coitus.

Senile vaginitis sometimes results in adhesions which unite portions of the vaginal walls and alter the size and shape of the canal; infantile vaginitis may have the same effect. Treatment of deformities of this kind is not generally required; but, if necessary, it should be carried out on ordinary surgical lines.

W. E. FOTHERGILL.

PROLAPSE OF THE VAGINA.

UNDER this heading rectocele and cystocele are included. Before discussing the treatment of these conditions it is necessary to differentiate them clearly from other conditions with which they may easily be confused.

Pure cystocele is bulging of the anterior vaginal wall together with the bladder and urethra through the vaginal orifice, the

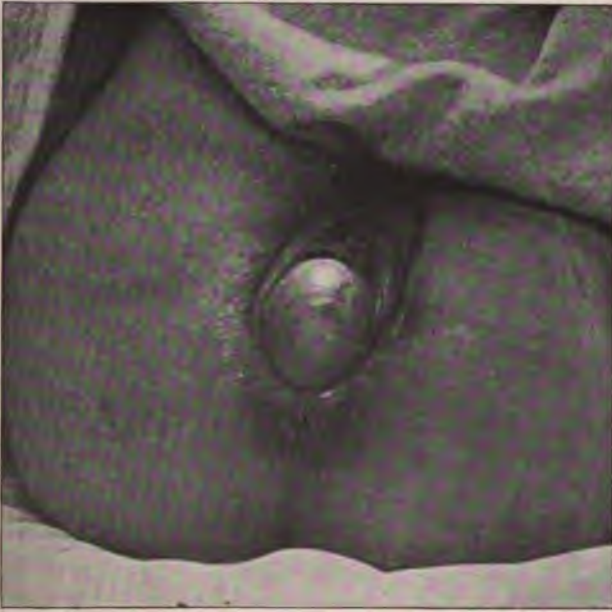


FIG. 1.—Cystocele.

uterus remaining in its normal position of anteversion. Thus, in a case presenting cystocele, if the uterus is found to occupy a position of retroversion, or if the uterus passes from anteversion into retroversion when the patient strains and "bears down," the condition is really an early example of classical prolapsus uteri, and is not an example of pure cystocele, for the characteristic feature of classical prolapse, the dislocation of the more movable portion of the pelvic floor from the more fixed portion, is the combination of the two physical signs, cystocele and retroversion.

Rectocele, again, is bulging at the vaginal orifice of the posterior vaginal wall together with the anterior wall of the rectum. This condition may occur alone,—pure rectocele; or together with pure cystocele,—rectocele and cystocele; or together with cystocele and retroversion,—prolapsus uteri complicated by rectocele.

Another condition which must be remembered is hypertrophy of the cervix, for in most cases the over-grown cervix, being attached



FIG. 2.—Rectocele.

to the upper part of the vagina, inverts and brings down with it the upper portion of the vaginal wall. In cases of this kind there need be neither rectocele nor cystocele. The lower portion of the vaginal wall need not be affected at all. The cervix may appear at the vaginal orifice, and the length of the vaginal canal may be halved by the inversion of its upper portion, but the condition is not one of vaginal prolapse, though it may, of course, be combined with rectocele or cystocele, and also with classical prolapse of the uterus.

The surgical treatment appropriate to prolapsus uteri and to hypertrophy of the cervix is very different from that required in

pure cystocele or in rectocele. Hence the necessity for accuracy in the diagnosis of these conditions and their various combinations.

The Preliminary Treatment of Cystocele and Rectocele, when Complicated by Ulceration.—In all cases complicated by ulceration, excoriation and the results of infection, the first essential is to secure a clean and healthy condition of the vaginal walls and the vulva, for ulceration of the vagina forbids either palliative or operative treatment. The patient should be confined to bed, and mildly antiseptic warm douches should be used once or twice daily. The vagina may be lightly packed with gauze or lint if this is necessary to keep the parts within the vaginal orifice. In some cases it may be necessary to retain the packing by means of a perineal pad and a T-bandage. A pessary of cocoa-butter medicated with iodoform or boracic acid may be placed in the vagina after each douche if the vaginal wall is badly ulcerated or inflamed.

The bowels, meanwhile, should be carefully regulated.

The Palliative Treatment of Cystocele and Rectocele.—Palliative treatment by pessaries and other mechanical supports is permissible under the following circumstances: (1) When operative treatment is refused; (2) when operation must be postponed, as during involution, during lactation, or during temporary ill-health; (3) when operation is contra-indicated by age, feebleness, or chronic disease.

It should be mentioned that, in some cases of slight rectocele and cystocele in patients at and after the menopause, the symptoms are due not so much to the displacements present as to degenerative changes in the vulvar integument with, superadded, the effects of chronic infection. In these cases senile vaginitis or vulvitis, urethral caruncles and red patches of vascular degeneration are the principal features, and the use of pessaries generally aggravates the sufferings of the patients.

When the vulva and the vaginal walls are healthy, and when the vaginal orifice is not too large, ring pessaries may be used. The best are solid rubber, but those of hollow rubber containing "watch-spring" will serve. It is of advantage, in cases of rectocele and cystocele, to have a complete diaphragm of perforated rubber across the lumen of the ring.

Ring pessaries act by stretching out the vagina sideways and upwards. The instrument, by its shape and its rigidity, converts the collapsible vagina into a wide flat cavity, corresponding to the pessary in size, shape and rigidity.

When intra-abdominal pressure is raised, as during defæcation,

the pessary is driven against the pubic arch, which retains it in position. If the vaginal orifice is very wide, the pessary will not stay in, because intra-abdominal pressure drives it downward and out, instead of forcing it forward against the pubic arch.

Before insertion, a pessary of suitable size should be softened and washed in hot water. It should be lubricated with soap, as contact with grease and oil causes rubber to perish very quickly. The patient lies in the left lateral posture, and the ring is squeezed into a narrow oval as it is gently pushed through the vaginal orifice. The ring is then adjusted so as to surround the cervix. The fit should not be so tight that a finger cannot be passed between the ring and the vaginal wall at any point, or irritation, leucorrhœa and, possibly, ulceration will be caused. But the ring should be large enough to flatten out the vagina, so that neither the anterior nor the posterior vaginal wall protrudes when the patient bears down. Whilst a pessary is being worn the patient should keep it clean by douching two or three times a week with normal saline solution (common salt, 3j to the pint) or with some very mild antiseptic. If there is any soreness, acetate of lead may be used (3j to the pint) from time to time. The pessary should be taken out and replaced by a new one as often as may be necessary. The life of rubber pessaries varies in duration; but few patients can wear one suitably for over three months. After the menopause atrophic changes reduce the size of the vagina, and each time a pessary becomes worn out it should be replaced by a smaller one, or ulceration will ultimately be caused.

As an alternative for the ring, a rubber ball pessary with tube and stopcock may be used. The ball is inserted by the patient when collapsed and is then inflated. At night it is deflated, removed and cleaned ready for insertion on rising.

When the vaginal orifice is too wide to retain either a ring or a ball pessary, an instrument of the old-fashioned cup-and-stem pattern may be tried. It is kept in position by four rubber tubes, which pass, two backwards and two forwards, to be attached to a belt, which should be worn round the hips in position of a hernia truss, and not round the waist of the patient. Instruments of this kind are removed by the patient every night and replaced in the morning. They are more suitable for cases of true uterine prolapse than for rectocele and cystocele.

Sometimes patients who are unable to wear pessaries are able to keep themselves fairly comfortable by packing the vagina with gauze, lint or small sponges, the packing being retained by a perineal pad and a T-bandage. If sponges are used they must be

carefully washed and disinfected every night, and should be kept in an antiseptic solution when not in use.

The Operative Treatment of Cystocele.—The first step in the operative treatment of cystocele is the removal of the redundant portion of the anterior vaginal wall. But in every case of cystocele the vaginal orifice either is enlarged by tearing of the perineum or is distended by the cystocele itself. Therefore the



FIG. 3.—Anterior colporrhaphy for cystocele. The incision is drawn small for the sake of clearness.

second step of the operation should always be a *perineorrhaphy*, designed to restore the vaginal outlet to its original size. In many cases the uterus should be curetted as a preliminary measure, and it is often advisable also to remove portions of the cervix if this is deformed by laceration and hypertrophy. There are several ways in which *anterior colporrhaphy* may be done; but a method should be chosen which does not shorten the anterior wall so as to pull the cervix downwards and forwards. For, if this is done, retroversion of the uterus is favoured, and this in turn is favourable to the development of true prolapsus uteri. The use of lines

of suture which cross the vagina transversely should therefore be avoided.

The following is a good method : Pull down the cervix with a volsellum. Pick up with forceps two points from 1 to 2 inches to the left and to the right of the middle of a line between the urethral orifice and the external os. Pick up a third point in the middle line at the junction of the cervix with the anterior vaginal wall. Connect these three points by a V-shaped incision

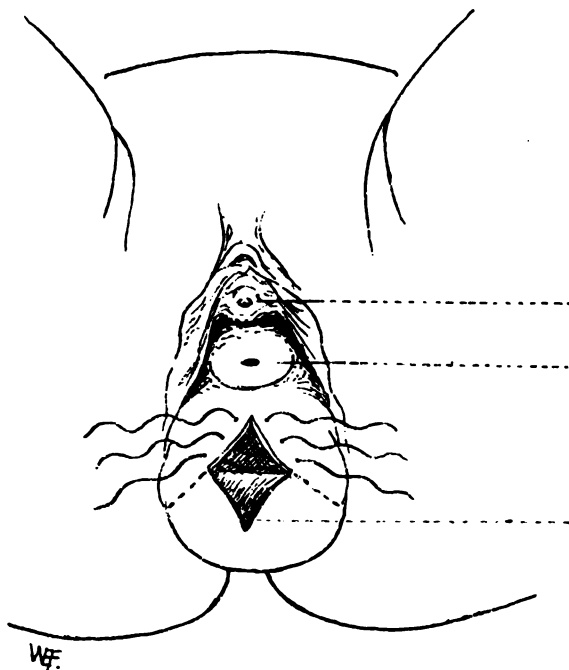


FIG. 4.

extending through the vaginal wall, but not deep enough to injure the bladder. Beginning at its tip, separate the V of vaginal wall from the bladder, and continue the separation until it reaches within an inch or less of the urethral aperture. Then cut away a A-shaped portion with the scissors, and thus complete the removal of a lozenge-shaped area of the anterior vaginal wall. The separation should be done by the fingers, assisted by the discriminating use of a pair of scissors ; and, if the latter has one sharp point for use in making the primary incision, no knife is required. The wound is closed from side to side with interrupted or continuous sutures of catgut, which will resist absorption for about two weeks. The

stitches may have to pick up small portions of the muscular wall of the bladder in order to check bleeding. If this is not done, a hæmatoma may form between the bladder and the vaginal wall, with considerable detriment to the success of the operation.

Having completed the anterior colporrhaply, the surgeon should narrow the vaginal outlet so that it will admit one finger. It will quickly stretch again sufficiently to permit coitus. Any good method of performing perineorrhaphy may be used for this purpose. (*See Repair of the Perineum*, p. 208.)

The Operative Treatment of Rectocele.—The first step in the operation for rectocele is the removal of the redundant portion of the posterior vaginal wall, and the second is the repair of the perineum, which, in cases of rectocele, has always been torn. Thus posterior colporrhaply and perineorrhaphy are required, and they should be combined in one operation, which may be called *colpoperineorrhaphy*. This may be done from below upwards, beginning with a U-shaped incision round the posterior aspect of the vaginal outlet. But the most generally useful method is to work from above downwards in stages, as described by Donald, of Manchester.

Pull down the posterior vaginal wall and pick up a point in the middle line 1 inch or more below the cervico-vaginal junction. Pick up two other points, left and right, $1\frac{1}{2}$ inches apart, and a similar distance from the first. Connect the three points by an incision through the vaginal wall, and, beginning at the tip, separate from above downwards a V-shaped portion of the vaginal wall. Close the V-shaped incision from side to side with interrupted or continuous catgut sutures. This completes the first stage. Now take two points right and left of the last stitch and about $1\frac{1}{2}$ inches nearer the vaginal outlet. Continue the incisions on each side to these new points, and separate the vaginal wall between them from the rectal wall as before. Close the wound from side to side as before. Thus working in stages, cutting and stitching in turn, remove a triangular portion of the posterior vaginal wall. The third or fourth stage brings the incisions down to the vaginal outlet, one on either side of it, and about $\frac{3}{4}$ inch behind the urethral aperture. The corresponding dissection raws the anterior surface of the perineum, and, when it is complete, the flap of posterior vaginal wall is cut away at the junction between the external skin and the vaginal wall. At this stage the two halves of the perineum are brought together by two or three buried sutures of catgut. The suture of the lower portion of the vaginal wound is then completed, and the operation is finished by closing the perineal

portion of the incision with silkworm gut or catgut hardened to resist absorption for from two to three weeks.

Hardly any local treatment is required after these operations for the relief of rectocele and cystocele. If the patient cannot pass water with the usual assistance, and if the bladder is found by abdominal examination to be actually distended, the catheter may be used, but it should not be employed any more frequently than is absolutely necessary.

The external parts should be frequently cleansed by gentle swabbing, or by a stream of water from a syringe or douche-can. The vagina should not be douched unless there is a blood-stained or purulent vaginal discharge. The patient should remain in bed until healing is complete and the scars are firm, but she need not be restricted as to position.

W. E. FOTHERGILL.

TUMOURS OF THE VAGINA.

Primary carcinoma of the vagina demands the most free excision which the circumstances will permit, due consideration being given to the proximity of the bladder and the rectum. Infiltrated portions



FIG. 1.—Myoma of posterior vaginal wall, extruded and ulcerated.

of these organs, if not too large, may be removed with the growth. Breeches thus produced in the continuity of the hollow viscera should be closed with catgut stitches, which are buried as the vaginal wound is closed. Extensive infiltration of either rectum or bladder renders the case unsuitable for operative treatment.

Primary sarcoma of the vagina, if not too advanced, may be treated like primary carcinoma.

Myomata of the vagina are easily enucleated after their covering

has been freely incised. One or more arteries may require ligation and the bed of the tumour should be closed by buried catgut sutures. Redundant portions of the vaginal wall having been removed, the vaginal wound should be closed with catgut sutures, and the patient should be put to bed with a light gauze packing in the vagina.

W. E. FOTHERGILL

The illustrations in this Section on Diseases, Affections and Injuries of Vagina, are taken from the Author's "Manual of Diseases of Women."

NON-HÆMORRHAGIC DISCHARGES FROM THE GENITAL TRACT (LEUCORRHŒA).

THE term leucorrhœa is somewhat loosely used to designate all the excessive non-hæmorrhagic discharges, either normal or pathological, which emerge from the genital tract of women at its external orifice, and on this acceptation I base the arrangement of the matter of this article.

These discharges are usually hypersecretions from the genital mucous surfaces and from their various glands, and are frequently due to irritation or infection by pathogenic organisms. They differ from each other in character, consistence and quantity according to the cause which provokes them, and according to the location from which they proceed.

Leucorrhœa occurs in virgins and in married women: it is most common during the child-bearing period of life, and amongst married women. It may be (1) a *simple hypersecretion* of the normal exudations from one or more portions of the genital tract, or a *hypersecretion with change in the composition of the secretions* but without pathological change in the mucosa; or (2) a *hypersecretion with alteration of the normal exudations due to some pathological condition of the mucosa*.

In the practice of gynæcologists it is not often that a woman comes for treatment for leucorrhœa unless a pathological condition of some portion of the genital tract is present. But general practitioners are frequently consulted concerning discharges of a passing character which can be cured by simple measures or will disappear spontaneously; on the other hand, many women mention casually the fact that they "suffer from the whites," which they regard as a trivial ailment, although it may prove to be a symptom of dangerous or deadly disease. Leucorrhœa must therefore always demand consideration, investigation by searching inquiries, and, in some cases, local examination of the parts whence the flow proceeds, with bacteriological examination of the discharge, and treatment of any disease or lesion which may be found. It is consequently within the scope of this article to refer very briefly to the most common local affections which may cause it, without elaborate descriptions of their treatment, but with special

reference to the best means of checking the co-existent discharge. But I wish to emphasise the fact that when treating the leucorrhœa one must simultaneously treat the disease or condition underlying it.

With regard to the question of local examination, it may be taken as a rule that whenever vulvar or pelvic pain, or profuse menstruation, or urethral irritation co-exists with leucorrhœa, or if the flow is excessive in quantity or has lasted a long time, or has a marked yellowish tinge, or is mixed with blood, or is foetid, a local examination should be made. In the case of virgins it is preferable to have an anæsthetic administered for the examination.

I will first describe (1) the leucorrhœa which may be regarded as an increase of the physiological secretions without or with alteration of the secretions, and will then deal with (2) leucorrhœa due to pathological changes in the mucosa.

LEUCORRHŒA AS AN INCREASE OF THE PHYSIOLOGICAL SECRETIONS.

Normal Secretions.—It is evident that the admixture of the different secretions from the various parts of the genital tract which takes place during their passage through the canal renders complex the discharge which emerges at the vulvar opening. This consists of the secretions from the Fallopian tubes, the body of the uterus, the cervix, the vagina and the vulva, and in health is not sufficient to stain linen excepting under special temporary conditions; it evaporates at the vulva and should not cause discomfort by undue moisture. One must, however, remember that the amount of the secretions varies in healthy individuals just the same as does the healthy nasal secretion.

The normal secretion from the Fallopian tubes is scanty and colourless; that from the uterus is colourless; that from the cervix is thicker, more tenacious in consistence, and colourless, like white of uncooked egg; that from the vagina is curdy and white; and the various secretions from the vulva produce a thickish white exudate. Döderlein's lactic-acid-forming, rod-shaped bacilli are always present in the healthy vagina, protecting it from pathogenic organisms which may obtain entrance, and rendering its secretion acid. A non-pathogenic fungus, *monilia candida*, is also often present.

The resultant discharge from all the secretions is sometimes

rendered opaque or slightly yellowish from the action of benign bacilli in the vagina, especially when there is hypersecretion.

Leucorrhœa as a Simple Increase of the Normal Secretions generally proceeds from the uterus (cervix and corpus) and the vagina, and is produced by any cause which excites congestion, but not inflammation. It need not be considered pathological unless the discharge becomes abundant, and is modified or altered in character. Blondes probably suffer more often from mild leucorrhœa than brunettes.

Post-menstrual leucorrhœa.—A normal leucorrhœa may occur just before and after the menstrual periods, and may be more profuse and prolonged after mental or bodily strain.

Post-sexual leucorrhœa.—After sexual excitement a mild leucorrhœa occurs, proceeding from the uterus, the vagina and Bartholin's glands, and may be kept up by excess.

Leucorrhœa of pregnancy and tumour.—Pregnancy and tumour in the neighbourhood of the vagina may produce a simple hypersecretion without alteration of the mucosa.

Leucorrhœa replacing menstruation.—In young girls, before menstruation has begun, it sometimes represents the normal periods for a few months. A similar leucorrhœa is often seen after the menopause. In simple amenorrhœa, in anæmia and chlorosis, and also in debilitated conditions of the system from disease, it is not uncommonly found replacing the normal catamenial flow.

Leucorrhœa of the menopause.—At the menopause a mild leucorrhœa occurs in a considerable number of women without any disease (perhaps about 15 per cent.), but any profuseness of discharge, especially if sanguinolent, should arouse suspicion of cancer.

Leucorrhœa due to other causes.—Many women get an occasional slight leucorrhœa, lasting only a few days, from temporary congestion of the genital organs, which may be the result of a chill or of strenuous exercise of any kind. Constipation, incomplete intercourse, masturbation, prolonged lactation, and too frequent child-bearing may produce it, and also passive congestions due to obstructions in the pelvic circulation, or through the liver, heart and lungs.

Leucorrhœa due to general diseases.—The so-called "constitutional" leucorrhœa, which persists indefinitely and is often seen in young women who are anæmic, chlorotic, debilitated, or may have a tuberculous or syphilitic taint, is generally an increase of the physiological secretions of the vagina and uterus, but is probably associated with an alteration in the composition of the secretions

without pathological affection of the mucosa. A similar leucorrhœa is present in the course of many chronic and debilitating affections of the system.

Leucorrhœa as an Increase of Altered Secretions.—It is probable that in any of the above forms of leucorrhœa a morbid change in the secretions themselves may exist or may supervene as the result of abnormal conditions of the nervous, circulatory, lymphatic or glandular systems without any pathological change in the mucosa of the genital tract. Such conditions may be produced by a defective bodily condition of the individual, or by distinct and definite general disease, which may probably modify and affect the interdependent action of the various glands of the body, and may cause an alteration and increase of the secretions of the genital canal, just as they cause alterations of the gastric and intestinal secretions. It is reasonable to imagine that insufficient secretion or hypersecretion of the ductless glands, such as the pituitary, the thyroid and ovary, may produce alteration of the secretions of glands with external secretions such as those of the uterus.

The existence of a morbid change in the secretions themselves probably explains the difficulty occasionally experienced in curing obstinate cases of apparently "simple" leucorrhœa. It is therefore of urgent importance that in simple leucorrhœa due to any cause, and especially in the "constitutional" leucorrhœa referred to, the general health of the patient should be the first consideration, and if she is prone to any diathesis, or is suffering from any recognised disease, general treatment must be directed to them. Hygienic measures, nutritious food, moderate exercise, out-of-door life, avoidance of fatigue, tonics such as arsenic, iron and cod-liver oil, are likely to be beneficial, and residence in a high, dry, bracing locality is indicated.

If there is reason to suspect that there is defective secretion from one of the ductless glands, the administration of one of the preparations of such a gland may be tried.

In *virgins*, vaginal examination is not always necessary; one may advise ablutions of the vulva with warm water, and in some cases borax douches (3j ad ℥j); in obstinate cases, more astringent douches, such as alum (3ss ad ℥j) or tannin (3j ad ℥j), may be used. In cases of doubt, or in cases which do not improve with treatment, local examination must be made.

In *pregnancy*, if the secretions are too profuse, tonic treatment must be prescribed, and bathing the vulva with boric acid (3ss ad ℥j) or lysoform (3j ad ℥ij), or some mild antiseptic lotion. Douching should seldom be advised.

Treatment of mild leucorrhœa from the other causes mentioned.—

This is plainly indicated; an attempt must be made to remove the cause, and local treatment, if needed, should generally be restricted to simple external ablutions in virgins, and vaginal douches in married women, containing chloride of sodium (3j ad ℥j), or borax (3j ad ℥j), or liq. sodæ chlorinatæ (3ij ad ℥j), or subacetate of lead (3ss ad ℥ij). In obstinate cases more astringent douches may be used.

LEUCORRHŒA DUE TO PATHOLOGICAL CHANGES IN THE MUCOSA.

A pathological discharge may proceed from one or more parts of the mucosa of the genital tract, and when it emerges at the vulva will be mixed with the secretions or hypersecretions (with or without morbid change in the composition of the secretions) from the other portions of the genital tract. (*See Leucorrhœa as an Increase of the Physiological Secretions.*) When a pathological condition of one or more parts of the mucosa supervenes in the course of a so-called "constitutional" leucorrhœa (previously referred to), the response to treatment will be tardy and difficult to secure.

It is a very common occurrence for a woman to have a very slight discharge going on for months or years to which she pays no attention, but which may be due to a cervical or uterine lesion.

It will be convenient to divide the cases into those in which the discharge proceeds *principally*—From (1) the vulva, (2) the vagina, (3) the uterus—(a) the cervix uteri, (b) the corpus uteri—(4) the Fallopian tubes. But leucorrhœa will frequently be found to be due to a pathological condition of two or more of these parts.

VULVAR LEUCORRHŒA.

The causes may be traumatic from different sources, contact with septic matter from without, venereal disease, specific fevers, skin eruptions, new growths, foreign bodies in the vagina; or may be secondary to vaginal or uterine discharges or fistulæ, and glycosuric, ammoniacal or highly acid urine. Obesity is an occasional cause.

Some of the above causes produce acute or chronic vulvitis, with a serous, viscous and sometimes purulent discharge, and other signs and symptoms of varying severity.

The most common cause of purulent cases (computed from hospital statistics) in children is said to be gonococcal infection, conveyed principally by fingers, towels, sponges, etc., and rarely by sexual contact.

But numerous mild non-purulent cases in children occur from other causes.

Vulvitis and Vulvo-Vaginitis in Children.—Give directions concerning prevention of its spread, and remove the cause. Examine discharges for pathogenic organisms. Keep the child isolated in bed. In mild cases, sluice the parts with borax or boracic acid (3ss ad ℥j) several times daily, and apply subnitrate of bismuth powder; or bismuth subnitrate 5 parts, salol 5 parts, and starch powder 20 parts. If the vagina is affected, inject the solution very slowly into the vagina with a male glass syringe, after sluicing the external parts. If the discharge should persist, or in purulent or gonococcal cases, use chloride of zinc solution (5 gr. to 1 pint), cyllin solution (3ss ad ℥ij), or permanganate of potash solution, 1 in 1,000 (about gr. 10 ad ℥j), and a weaker solution of these if the vagina is affected. In intractable cases, paint with 5 per cent. protargol solution two or three times a week; inject a 3 per cent. solution if the urethra is involved, and syringe out the vagina with protargol (3 per cent). General tonic treatment is advisable.

Mild Vulvitis in Women.—Remove or treat the cause. Advise frequent ablutions and vaginal douches with a weak antiseptic lotion, and powdering with bismuth or equal parts of oxide of zinc and starch, or boric acid and starch powder, ʒj ad ʒj.

Gonococcal Vulvitis in Women.—In acute cases, if the vagina and cervix are not affected, avoid digital and instrumental examinations. Rest in bed for at least three weeks should be enforced, and the patient kept under observation for at least three months, in order that treatment can be efficaciously pursued and sequelæ prevented. Prophylactic measures against infection of others must be enforced. Increase the flow of urine by copious draughts of water and milk; order light diet, and prohibit alcoholic drinks. Prescribe urotopine (10 gr.) or helmitol (15 gr.) night and morning in ½-pint of cold water; or 15 gr. of acetate of potash with 15 minims of tincture of hyoscyamus, in water, if urethral discomfort is intense. Advise sitz baths in warm weak starch-water thrice daily, and sluicing five or six times daily with solutions such as permanganate of potash, 1 in 1,000 (about gr. 10 ad ℥j), formalin, 1 in 1,000 (about ʒ10 ad ℥j) (or lysoform, ʒss ad ℥ij), cyllin (ʒss ad ℥iv), or subacetate of lead (ʒss ad ℥j) in poppy decoction, and the application of bismuth powder after the parts are dried. Strong germicidal solutions are irritating in the acute stage, but the strength of these solutions may be slightly increased later. If the vagina is not attacked, abstain from douching, but when vaginitis exists, copious douches of one of the above-mentioned solutions, but more diluted,

should be used very gently after the sluicing. If the disease is not cured after four to six weeks, it may be considered chronic; as long as a purulent secretion can be pressed out of the urethra, or out of Bartholin's vulvo-vaginal ducts, there is always danger of relapse or of extension.

Chronic Gonococcal Vulvitis.—Clean the vulva with biniodide or perchloride solution of mercury, 1 in 3,000, and douche with 1 in 3,000. If pus remains in Bartholin's ducts, they should be swabbed out with protargol solution (10 per cent.) on a fine cotton-wool probe, or the solution may be injected with a blunt-pointed syringe; or the duct may be laid open on a probe-pointed director, swabbed with the 10 per cent. protargol and packed with 2 per cent. protargol gauze. If the gland itself is involved and swollen, remove it by dissection, or if an abscess of the gland has formed it must be laid widely open, scraped, swabbed with tincture of iodine, packed with iodoform gauze and dressed till it heals. The urethra may be injected with 5 per cent. protargol solution; and, as the disease often lingers in Skene's glands, a solution of 10 per cent. protargol or 5 per cent. silver nitrate solution may be injected into the glands through a large hypodermic needle after applying 10 per cent. cocaine solution, the orifices of Skene's glands, one on either side of the urethra near its orifice, being exposed by bent hairpins held by forceps.

VAGINAL LEUCORRHŒA.

The vagina, being protected by thick epithelium and by Döderlein's lactic-acid-forming bacilli, is not infected as frequently as one would expect. Many women suffer at odd times from a whitish or mucopurulent flow, which is not very copious and lasts a week or two, resembling in its passing character a nasal catarrh, and proceeding partly from the vaginal mucosa and partly from the endometrium.

In some cases there is no evidence of vaginitis or endometritis, and yet a persistent discharge continues indefinitely.

DOUCHES.—The experiments of Sirédey and Lemaire tend to prove that in non-infective cases, or when infection has disappeared, mild alkaline solutions only should be used, such as: Liq. Sodæ Chlorinatæ, ʒss ad ʒij, or Borax, ʒj vel ʒiiss ad ʒj, or Bicarbonate of Soda, ʒj ad ʒj, and at a temperature not higher than 100° F.

In infective cases they advise bactericides, such as permanganate of potash, picric acid and silver preparations; they consider perchloride of mercury, salol and very hot douches especially irritating.

DOUCHING.—Instruct the patient to keep douche nozzles clean, and when not in use folded in a clean linen bag and placed in a

box. The nozzles should be made of glass or metal or indiarubber, perforated at the sides only. Before being used, they should be soaked in an antiseptic solution or boiled. The nozzle should not be passed too far into the vagina. A syphon douche-tube which can be used with a jug is convenient. In obstinate cases of vaginitis it is sometimes preferable to use a fenestrated wire speculum (bath-speculum), which distends the folds of the vagina and allows the fluid to gain better access to the mucous membrane. Such a speculum, combined with a douche nozzle to which the douche-tube may be attached, can be procured from surgical instrument makers. For cleansing and astringent purposes use 1 to 4 pints of fluid at a temperature of 90° F. to 100° F. For the relief of uterine pain or for causing contraction of the uterus use 1 to 2 gallons of hot water from 105° F. to 115° F. or even 120° F., administered slowly.

VAGINAL DISTENSION WITH LOTIONS.—Small injections of strong or expensive solutions, such as the organic silver preparations, may be passed to the summit of the vagina with a glass syringe holding 5 oz., after a previous cleansing douche, using about 2½ oz. at a time. The fluid should be retained a few minutes in the distended vagina, the hips being raised and the labia held together by the hand in order to keep the solution from escaping.

In young unmarried women attention must be directed to the general health, to any existing constitutional flaw, to constipation or other existing ailments, and vulvar ablutions may be advised. Local treatment may not be necessary. If no improvement results, try douches of borax solution (3j ad ʒj, increasing to 3ij ad ʒj), proceeding in case of failure to sulphate of zinc (3j ad ʒj) or tannin (3j ad ʒj). But in doubtful cases examine with a small Fergusson's speculum preferably under an anæsthetic, and treat according to the condition found.

In married women examination should not be delayed. If no definite cause for the leucorrhœa can be discovered, treat with mild alkaline douches, proceeding in case of failure to douches of alum (3j ad ʒj), or sulphate of zinc (3j ad ʒj), or chloride of zinc (gr. 10 ad ʒj).

The late Sydney Ringer advised vaginal injections of sod. bicarb. (3j), tinct. belladon. (3ij, vel 3iij), aq. (ad ʒj) [U.S.P. sod. bicarb. (3j), tinct. belladon. (3iiss vel 3ss), aq. (ad ʒj)], the action of the belladonna being relied on to check secretion. "Ovules" containing ext. belladon. (gr. 1), ac. tannici (gr. 10), ol. theobrom (3ss) may be used at bedtime for a week, one being passed as far up the vagina as possible after the patient goes to bed.

Puerperal Vaginitis.—Leucorrhœa is very prevalent shortly after

child-birth as the result of parturition, the vaginal walls often remaining abraded, congested and sub-involuted.

Examine carefully for lacerations of perineum, vagina and cervix, for endometritis and for retro-flexion. Prescribe cyllin douches (3ss ad ʒj) for a few days; then douches of subacetate of lead (3ss vel ʒj ad ʒj) for several weeks, and give the following mixture: *R.* Liq. Strychninæ, m 2; Ext. Ergot Liq., m 20; Aq. Chlorof. ad ʒj [*U.S.P.* *R.* Strychnin. Hydrochlor., gr. $\frac{1}{55}$; Fluid-extract. Ergotæ, m 20; Aq. Chloroformi, 3ss; Aquam, ad ʒj] twice daily. Any displacement should be rectified, and the perineum repaired later if necessary.

Other solutions in common use are sulpho-carbolate of zinc (ʒj ad ʒj), Condyl's fluid (liq. potas. permang.) (ʒj ad ʒj) [*U.S.P.* Potass Permang. gr. $\frac{1}{2}$; Aquam. ad ʒj], tannic acid (tannin) (ʒj vel ʒij ad ʒj), boracic acid (3ss ad ʒj), liq. plumbi subacetatis (3ss ad ʒj), chamomile infusion (ʒj of the flowers to ʒj hot water), lysoform (containing formalin) (ʒj ad ʒj) and sanitas (containing peroxide of hydrogen) (ʒij ad ʒj).

DRY TREATMENT BY INSUFFLATIONS.—If the result is not satisfactory, apply ʒj subnitrate, salicylate or subgallate of bismuth to the cervix and walls of vagina through a Fergusson's speculum by means of an insufflator, after cleansing the vagina with dry wool. I have used these powders for several years with good results. Repeat the treatment every two days for a few weeks, douching the vagina once weekly. Kaolin (aluminium silicate) or talc (magnesium silicate) may be substituted. More Madden advises equal parts of iron, alum or of boric acid and alum or loletin.

DRY TAMPONADE.—A dry tamponade of the vagina, repeated daily for a week with bismuth gauze, is also useful.

VAGINAL DISTENSION WITH LOTIONS.—In obstinate cases of vaginitis, especially when cervicitis exists, small daily injections of a solution of one of the organic silver preparations, which are less corrosive and less irritating than nitrate of silver, may be tried, thus: *R.* Pulv. Albargin (vel Protargol), gr. 15 vel gr. 20; Aq. Destil., ad 3v; or nitrate of silver solution (gr. 2 ad ʒj) may be used. Continue this treatment for a fortnight. Albargin is cheaper than protargol.

TAMPONS.—Another useful method of using one of the organic silver preparations is to apply to the cervix through a speculum a tampon with a silk string attached, saturated with a 1 or 2 per cent. solution of albargin or protargol: the tampon to be removed in twenty-four hours, and the treatment continued daily for a week or longer.

SWABBING.—In intractable cases, swabbing the vagina with

protargol (10 to 20 per cent.) may be tried, or nitrate of silver (5 to 10 per cent.), after protecting the vulva with vaseline and applying cocaine to the vagina when using nitrate of silver.

VAGINAL SUPPOSITORIES (also known as "pessaries" or "ovules") containing various medicaments may be serviceable occasionally.

Gonococcal Vaginitis.—Many observers believe that the most common cause of vaginitis is gonorrhœa; failure to find the gonococcus does not negative the disease. Several other pathogenic organisms may convey infection to the male urethra.

In the acute stage rest in bed must be enforced, and copious warm douches administered *very gently* several times daily, such as: Potas. Permang., gr. 2 ad ℥j (1 in 5,000); Formalin, 1 in 1,000 (about m10 ad ℥j); Cyllin, 3ss ad ℥ij; or Lysoform, 3ss ad ℥ij. A pessary composed of bismuth. carb. (gr. 15) and ol. theobrom (gr. 15) may be placed in the vagina, or a small strip of bismuth gauze to act as a drain.

Dardenne as the result of a long out-patient experience at the French Hospital in London prefers douches of sulphate of zinc (3iss), with gr. 3 of permanganate of potash in a quart of water, administered gently three times daily, and the daily application to the cervix of a tampon soaked in salol glycerine (salol 3j, glycerine 3vij), and claims that he gets fewer cases of extension to the uterus and tubes by this method than by others he has tried.

The so-called *abortive treatment* of acute gonococcal vulvovaginitis, recommended by some writers, by thorough "disinfection" under anæsthesia of the genital tract, including the cervix and uterus, by strong caustic germicides, is not an established procedure, and may promote rather than prevent extension of the disease to the uterus and peritoneum. If attempted, it should be carried out by a gynæcologist.

If the vaginitis becomes *chronic*, swab the vagina once weekly with protargol solution (10 to 20 per cent.) or nitrate of silver (5 to 10 per cent.), taking care to protect the vulva by the previous application of vaseline, or try the dry bismuth treatment, albargin injections or protargol tampons (*see* p. 563), or protargol "ovules" (containing gr. 3 protargol to 3ss theobroma oil). Peroxide of hydrogen solution up to 10-volume strength (liq. hydrogenii peroxidi) is also useful. General treatment must not be forgotten; the internal administration of preparations of yeast may be advised. (For Vaccine Treatment, *see* p. 572.)

Vaginitis of Pregnant Women.—Sometimes the hypersecretion common during pregnancy becomes purulent, and may be traced to recurrence of a latent gonorrhœa.

Very gentle douching with cyllin or formalin solutions may be necessary, and occasionally it may be advisable to swab the vagina with protargol solution (10 per cent.). "Ovules" containing germicides made up with theobroma oil may be used if syringing is judged to be dangerous, thus: *R.* Ac. Carbolici, gr. 1, vel Protargol, gr. 3; *Ol.* Theobrom., ad 3ss; *m.* : *ft.* ovule : mitte vj. One to be used at bedtime, as directed.

Senile Vaginitis.—After the menopause a form of vaginitis may occur in which the discharge is serous, foetid, and occasionally blood-stained, and may arouse suspicion of uterine cancer. Mild treatment is not always successful, and swabbing the vagina with 20 per cent. protargol solution, or a strong preparation of carbolic acid (7 of acid to 1 of water) may be necessary. For the accompanying pruritus try menthol 3 gr., carbolic acid 5 gr., chloral hydrate 20 gr., camphor 20 gr., lanoline 1 oz.

Ulcerative Vaginitis proceeds from foreign bodies, the use of pessaries, or from the rupture of collections of pus in the mucosa.

Treatment consists in cyllin douches, and application of tinct. iodi to the ulcers, or subgallate of bismuth powder.

UTERINE LEUCORRHŒA.

The discharge comes from the cervix uteri and the corpus uteri. It may be a hypersecretion due to congestion preceding and following the periods, or to pregnancy, or to sexual irritation and excesses, and the secretions may become altered by contact with vaginal secretions, and may appear pathological without there being any evidence of uterine disease; also in certain cases there may be, as the result of a chill or during the menopause, a profuse white flow lasting for some days. Such cases, omitting pregnancy, will generally yield to treatment by warm douches containing alum or acetate of lead (5j ad ʒj). Sedative drugs may be given, such as: *R.* Sod. Bromidi, gr. 6; *Ext.* Hydrastis Liq., ʒ5; *Ext.* Piscidiæ Erythrinæ Liq., ʒ20; *Elix.* Viburni Prunifol. (B.P.C.), ʒij; *Aq.*, ad 3j, three times daily.

But most frequently uterine leucorrhœa is due to inflammatory conditions of the uterus and its lining membrane. Abortion and parturition are the great factors which lead to their production. The next commonest factor is gonorrhœa, either directly implanted in the cervical canal or spreading from the vulva or vagina. Other causes are septic infection from instruments, fingers or douche nozzles, pathogenic organisms already in the vagina, laceration of cervix, new growths, diseases spreading from the vulva or vagina, or from the Fallopian tubes, fistulæ, impeded pelvic circulation,

pelvic tumours and displacements. Owing to contiguity, the endometrium of the cervix and of the corpus uteri must often be affected at the same time.

In order to secure a correct diagnosis, examine bi-manually and with a speculum.

(a) *Leucorrhœa from Affections of the Cervix.*—In cervicitis and endo-cervicitis the discharge is generally thick, ropy, mucopurulent, glairy and yellowish, is dislodged with difficulty, and often comes away in large pieces at intervals of several hours or even days. The predisposing causes are laceration, excessive coitus, foreign bodies, polypi; exciting causes are bacteria, especially gonococci, reaching the cervix direct, or by extension from the vulva or endometrium. The cervix is enlarged, and the cervical glands may become a culture-ground for bacteria. Chronicity supervenes in most cases, and the condition may go on for years unless treated.

Gonorrhœa is a frequent cause of endo-cervicitis, and often leads to persistent chronicity. *Leucorrhœa* in recently married women always demands attention, because young men with a chronic gleet, which they think is cured, often marry, and may infect the cervix uteri. On the other hand, married women suffering from vaginitis, erosions of the cervix and endo-cervicitis, which are not of gonococcal origin but due to other bacteria, may cause urethritis in their husbands.

Acute Endo-cervicitis.—Rest, saline purges, mild permanganate douches, 10 per cent. ichthyol and glycerine tampons, and a short course of sodium iodide (gr. 5) and sodium bromide (gr. 10). Obtain secretions from the cervix for bacteriological examination. Do not apply strong caustics to the cervical canal in the acute stage.

Chronic Endo-cervicitis.—When the condition is chronic, local treatment should be employed if there is no evidence of tubal mischief. In mild cases expose the cervix and apply iodised phenol (1 part of iodine to 4 parts phenol) by means of Playfair's probes to the cervical canal and erosions, and insert a glycerine plug in contact with the cervix. Liniment of iodine or carbolic acid may be used instead of the iodised phenol; or chloride of zinc (20 to 30 per cent.), or protargol (15 per cent.), or formalin (10 per cent.). Repeat the treatment every six days for a few weeks.

Erosions.—In mild cases, swabbing with iodised phenol once weekly for a few weeks will be successful. More severe cases will get well more quickly after scraping with a sharp spoon, followed by the applications, or after the use of Paquelin's cautery.

Chronic Endo-cervical Catarrh in Nulliparæ.—In nulliparæ the

cervical catarrh is exceedingly intractable, especially when of gonococcal origin. In such cases a sulphate of zinc and alum stick may be inserted once weekly through a speculum by means of vaginal forceps into the cervical canal, and kept *in situ* by a tampon smeared with sterilised vaseline. The patient should rest in bed till the next day, and should then remove the tampon. But frequent use of caustics will cause contraction and atresia of the canal, and in cases of long standing I have found it preferable to scrape out the cervical canal with a very sharp, tiny spoon after slight dilatation (and sometimes without dilatation) under anæsthesia, and then apply liniment of iodine or protargol (15 per cent.) on a strip of gauze. I usually remove a wedge-shaped piece of tissue from the posterior lip of the cervix at the same time, in order to maintain patency of the os, or the lips of the os may be divided bi-laterally. Treatment with the liniment of iodine or protargol should then be pursued for a time.

Findley, of Nebraska, recommends the application to the endocervix of 10 to 40 per cent. formalin. Ablation of the diseased cervical mucosa (Schroeder's operation) in these obstinate cases, both in nulliparæ and in parous women, is sometimes necessary.

Severe Cases with Laceration.—In parous women with badly torn and everted and hypertrophied cervixes, Emmet's operation for repair of the tears is indicated; and in certain cases of chronic cervicitis with laceration, erosion, hypertrophy and ectropion, removal of a portion of the cervix is necessary.

Mucous Polypi.—Small polypi may cause a muco-purulent, glairy, sanguinolent and possibly fœtid discharge. Twist them round with forceps till they fall away, scrape the cervical canal, and apply iodised phenol or 10 per cent. formalin.

Pinhole Os in nulliparæ may cause partial retention of secretions and discharge. Treatment consists in incision of the external os on either side with scissors, disinfection of the canal, and, if necessary, dilatation of the internal os.

Acquired Stenosis may cause a similar condition.

Simple ulcer due to pessaries, and to friction in prolapsus uteri, causes a purulent discharge, easily cured by antiseptic douches and bismuth powder or tincture of iodine.

Cancer of the Cervix, most frequent in parous women after the age of thirty, may begin in the vaginal portion or in the cervical canal. In early carcinomatous ulcer of the cervix the only symptom may be white or yellowish discharge for several months. Friability, and bleeding when touched, are the two chief signs, and are not usually present in granular erosions. In cases of doubt, a piece must

be excised, and if the microscope proves the existence of cancer, the treatment is removal of the uterus without delay, assuming there are no contra-indications. But many patients complain of sanguinolent, fœtid leucorrhœa, and advanced cancer of the cervix is found with extension to the vagina, which would make hysterectomy futile. In some of these distressing cases much relief can be given by palliative treatment. The breaking-down portions of the mass may be cut and scraped away under an anæsthetic, Paquelin's cautery being applied to the underlying firmer tissues, and followed by the application of acetone; a tamponade of iodoform gauze should then be inserted. Daily douches of permanganate of potash (gr. 5 ad ℥j) or solution of peroxide of hydrogen (1 in 10), or bismuth insufflations may then be tried. In less advanced cases, which are, however, inoperable, great lessening of discharge, pain and bleeding is secured by the use of acetone once or twice weekly; $\frac{1}{2}$ oz. to 1 oz. of acetone is poured on to the affected area through a Ferguson's speculum, the vulva being protected, and is allowed to remain ten to twenty minutes, the pelvis meanwhile being raised. The vagina is then dried and a pack inserted for a few hours. The treatment may be repeated twice weekly.

When pain is severe, daily vaginal injections of chloral hydrate (3ss ad ℥ss,) may be advised; and if bleeding is troublesome, turpentine (3j ad ℥j) may be tried. Occasionally plugging with thymol, bismuth, or aluminium acetate gauze will be found useful.

(b) *Leucorrhœa from Affections of the Corpus Uteri.*—The discharge is more watery and less viscid than that proceeding from the cervix; the presence of pus or sanguinolent pus renders it turbid, but it is of course frequently associated with cervical and vaginal leucorrhœa. It may be purulent and also fœtid. The speculum must be passed, the cervix cleansed with cotton-wool, and the discharge may be seen to exude, and if there is no evidence of cervical affection it may be assumed to proceed from the body of the uterus, especially if there is abnormal patency of the os internum, increased length of the uterine cavity and tenderness of the uterine body.

Acute Endometritis.—When acute, the symptoms are pain, tenderness of the hypogastrium and fever. Treatment of the resultant leucorrhœa can only be palliative both in septic and gonococcal cases, and includes mild, warm antiseptic douches; but any measures indicated by the cause of the condition will, of course, be necessary; thus, in cases occurring soon after abortion or parturition, intra-uterine douches of cyllin solution (3ss ad ℥j)

may be indicated. The great danger is the extension of the disease to the peritoneum.

Chronic Endometritis.—In the majority of cases which are seen the condition is subacute or chronic.

In chronic endometritis with subinvolution after abortion or parturition, from retained products of conception, the discharge is sometimes fetid, and is often associated with menorrhagia and displacement; the body of the uterus is enlarged. When no other complications are present, such as salpingitis or perimetritis, curettage under an anæsthetic is necessary, and the patient should remain in bed ten days or longer, and should take small doses of ergot and strychnine for a few weeks.

Subinvolution is not always caused by retained products of conception, but leucorrhœal discharge is often one of its symptoms. Treatment consists in giving hot, mild antiseptic douches at 112° F., and liquid extract of ergot (m20) and solution of strychnine hydrochloride (m2) [U.S.P. fluid extract of ergot (m20), and strychnine hydrochloride (gr. $\frac{1}{5}$)], three times daily for a month or longer. If the discharge persists, curette the uterus and apply iodised phenol, for it is not always possible to determine the absence of retained *débris*. If patients refuse operation, try intra-uterine applications of iodised phenol, making from four to eight applications at intervals of a week, but do not apply this treatment within four days of the beginning or end of a menstrual period.

Chronic endometritis from other causes, with profuse discharge, may sometimes need intra-uterine applications of iodised phenol or other caustic applications, and occasionally curettage. But if pain and congestion of the uterus are prominent symptoms, rest in bed and a preliminary course of ichthyol and glycerine (10 per cent.) tampons applied to the cervix may be used, and will sometimes obviate the necessity of other treatment.

Gonococcal Endometritis.—Gonorrhœa may spread from the cervix and attack the endometrium, in which case it often reaches the tubes and peritoneum. When the condition is *acute* the treatment should be palliative only. There is no evidence forthcoming that the application of strong antiseptics to the uterine mucosa in acute cases, or curettage, as advised by some writers, prevents the spread of the infection to the Fallopian tubes.

In chronic gonococcal endometritis no local treatment should be undertaken if there has been any recent salpingitis or perimetritis. If the discharge is profuse, apply protargol solution (10 per cent., increasing to 20 per cent.), or iodised phenol, or formalin (10 per cent.) to the uterine cavity once weekly for a few

weeks. In very obstinate cases of long standing which cause worry to the patient *curettage*, followed by applications of 20 per cent. protargol, or iodised phenol, may be tried. But this measure should only be resorted to if the tubes are healthy, and if the condition has existed several months.

When the tubes become inflamed and pyo-salpinx forms from an extension of infection it is generally wise to abstain from operation during the acute stage on account of the risk. In the chronic stage of *salpingitis* with perimetritis good results may often be secured by rest, the application of 15 per cent. ichthyol and glycerine tampons, and the administration of preparations of mercury and iodides. But when the tubes contain *pus*, ablation of the adnexæ is necessary, preferably in the chronic stage.

Leucorrhœa after Operations.—After the adnexæ are removed, leucorrhœa continues for a time in about 30 per cent. of cases, and may require treatment. Discharge from the stump of the cervix and the vagina after subtotal hysterectomy sometimes occurs; also from the vagina after total hysterectomy.

Senile Endometritis.—The so-called *senile endometritis*, producing *mucopurulent, blood-stained discharge*, is probably associated with adenomatous or carcinomatous disease of the endometrium, and may require hysterectomy.

The treatment of this condition is discussed in the section on Chronic Endometritis, p. 622.

Adenomatous Disease of the corporeal endometrium (sometimes called fungous, villous, or polypoid or glandular and interstitial endometritis) causes thin watery, mucopurulent or sanguinolent discharge, and often menorrhagia and uterine enlargement. The treatment is dilatation of the cervix under an anæsthetic, exploration of the body, thorough curettage, followed by the application of iodised phenol, or formalin (20 per cent.). If relapse occurs, the treatment must be repeated; it may eventually be necessary to advise hysterectomy on account of malignancy.

Fibroids with hyperæmia of the mucosa may cause much yellow flow, especially if the fibroid is dead. Hysterectomy is advisable in most of such cases.

A Fibroid Polypus when extruded from the cervix and lying in the vagina often produces a fœtid, mucopurulent, sanguineous discharge. The treatment is removal of the polypus, after careful antiseptic douching of the vagina for two or three days. If the uterus contains other fibroids, it may be necessary later to advise hysterectomy.

Cancer of the corpus uteri, most frequent in nulliparæ after the

age of forty-five, may begin with a white discharge after the menopause, which gradually becomes sanious, and there are irregular hæmorrhages. The organ is enlarged. After dilatation of the cervix, remove a fragment of tissue with a curette for microscopic examination. If evidence of cancer is shown, the uterus should be removed, preferably by the abdomen.

Sarcoma, including deciduoma malignum, causes leucorrhœal discharges and hæmorrhages. Hysterectomy is indicated, but the disease is usually incurable.

Spa Treatment of Uterine Leucorrhœa.—In obstinate cases of uterine leucorrhœa, which defy ordinary treatment, a course of spa treatment at Woodhall Spa, Harrogate, Salies-de-Béarn, Saint Honoré, St. Sauveur, Luxeuil, Royat, Ems, or Schwalbach may be advised. Woodhall Spa, Kreuznach, Franzensbad, or Salsomaggiore are specially serviceable when the leucorrhœa is associated with chronic salpingitis or fibroids.

Leucorrhœa from the Fallopian Tubes is uncommon, and can only be surmised when a gush of watery or purulent fluid escaping from the vagina precedes the rapid disappearance of a swelling which was known to exist in the region of the tubes, and which on bi-manual examination had been diagnosed as a hydrosalpinx or pyo-salpinx. In such a case an exploratory abdominal section should be performed, and the tube removed if evidence of disease is found.

TREATMENTS RECENTLY ADVOCATED FOR LEUCORRHŒA.

Local Treatment by Lactic Acid.—Ilkevitch recommends 3 per cent. vaginal injections of lactic acid in water for leucorrhœa of the vagina and cervix. Robin and Dalché insert tampons soaked in 3 per cent. lactic acid in glycerine to the summit of the vagina, leaving the plug till the next morning, and then advise a douche daily.

Local Use of Lactic-Ferment Preparations.—Recently this treatment has been adopted by several observers in the leucorrhœa caused by chronic gonocœcal and mixed infections, apparently with some success, the idea being to assist Döderlein's lactic-acid-forming bacillus in its protective influence. (Martindale prepares "Trilactine, special for injection.")

Eyre uses 2 to 4 drachms of a forty-eight hours' culture of sour milk-whey poured through a very long glass speculum to the summit of the vagina, and inserts a plug.

It is difficult to judge of the efficacy of the treatment compared with that of other treatments, as these cases received special attention.

Treatment by Yeast Applications.—Several French and German gynecologists within recent years claim success in the treatment of vaginitis and cervicitis from the application of yeast, used on account of its bactericidal action. French writers advise the injection once weekly to the summit of the vagina of $2\frac{1}{2}$ to 5 drachms of fresh yeast made into a syrupy solution with beer, and kept in by a tampon. German writers recommend the use of: (1) Fresh yeast with a little added sugar; or (2) solidified pessaries made up of fresh yeast, asparagin and gelatine; or (3) of dry yeast preparations such as Zymin or Furunculine.

Dry Treatment with Yeast Powder and Kaolin.—Abraham recommends the insufflation of yeast powder mixed with cane sugar, kaolin, sulphate of magnesia, phosphate of soda, carbonate of soda and carbonate of potash, using 5ss to ʒiiss blown on to the cervix and vaginal walls. ("Xerase powder and Xerase capsules," prepared by J. D. Riedel, Berlin.) The powder may also be applied in a gelatine capsule containing about ʒj, and must then be fixed with a tampon, which is removed in forty-eight hours. The vagina is then cleansed and a fresh capsule inserted. He claims good results in acute and chronic gonococcal and non-gonococcal cervicitis, erosions, and endometritis after using several capsules.

Dry Treatment by Kaolin Insufflations.—Various German writers within the past few years report favourably on treatment by Kaolin (sterilised white aluminium silicate), the "*bolus alba*" of the German Pharmacopœia. Max Nassauer reports success in the treatment of leucorrhœa from acute and chronic vaginitis, erosions, ulcers, cervicitis and inoperable carcinoma by the insufflation into the distended vagina every fifth or sixth day of Kaolin, by means of a specially constructed insufflator; no douching is allowed excepting just before the insufflation.

Vaccine Treatment in Leucorrhœa.—Treatment by vaccines is still on its trial, and should be undertaken with caution. Eyre and Stewart report cases of gonorrhœa treated by gonococcus vaccines. The vaccine is very toxic, and is not devoid of danger unless used in *small doses*. Autogenous vaccines give better results than stock vaccines. In acute gonorrhœa they advise a dosage of one million to ten millions, repeated at short intervals. In chronic gonorrhœa they recommend one to two-million doses every three to five days. After a five-million dose there should be a lapse of five to seven days; and after a ten-million dose an interval of eight or ten days.

Gonococcal arthritis is distinctly benefited. Butler and Long consider they had success in the vaccine treatment of gonococcal vulvo-vaginitis in children.

Eyre states that cases of chronic cervical catarrh, in which the pneumococcus has been isolated from the discharge, will clear up by the use of vaccines prepared from the discharges. He also finds that those cases of chronic cervical catarrh in which the staphylococcus albus is the only organism which can be recognised, and in which the blood shows a low resistance to the organism, are occasionally benefited by vaccine preferably prepared from the secretion. He advises treatment by lactic acid whey, applied once weekly on a probe covered with cotton wool to the cervical canal, during the vaccine treatment.

Treatment by Ionic Medication.—Introduction into the tissues of medicaments by ionisation has been recently recommended, but demands some special knowledge of electro-chemical therapeutics. Sloan recently reported success from iodine and copper ionisation in obstinate vaginal, cervical and uterine discharges, but two of his cases contracted cellulitis during the treatment; the method cannot, therefore, be regarded as advisable excepting in very intractable cases which defy other treatment.

CONCLUSIONS.

It will be seen from the foregoing account of "Leucorrhœa" that success in treatment will depend to a great extent on a correct diagnosis of the cause of the trouble. The multiplicity of the different methods of treatment mentioned as alternatives in the attempt to cure some of the more common affections causing the discharge, indicates the occasional extreme obstinacy and persistence of these affections in defying curative measures. The importance of tonic treatment in many of the conditions must not be under-estimated, including as it does all hygienic, dietetic and tissue-repairing principles. Amongst the multitude of pharmaceutical preparations in the hands of the profession, the old-fashioned and somewhat neglected cod-liver oil deserves an extended trial in the case of debilitated and neurasthenic women.

The importance of the treatment of leucorrhœa and the conditions underlying it is much greater than is generally considered: I believe that not a few cases of arthritis deformans and other forms of arthritis in women (as well as gonococcal arthritis, which is not always recognised and is more common than is generally believed) may be traced to neglected and unsuspected leucorrhœa.

Assuming that the microbic theory of the origin of arthritis deformans is correct, it is easy to understand that the germ or germs which cause the disease may frequently flourish in the vagina and uterus without being detected, just the same as does the gonococcus. It is certain that a large proportion of women suffer from a slight leucorrhœal discharge which they regard as trivial (never seeking treatment), but which often arises from vulvitis, vaginitis, a small erosion of the cervix, cervicitis, or endometritis, and may be exposing them to the risk of becoming a prey to a grave disease, such as arthritis deformans.¹

SEPTIMUS SUNDERLAND.

REFERENCE.

- ¹ Proc. Roy. Soc. Med., 1910, III. (Sect. of Baln. and Clim.), p. 111.

DISEASES, AFFECTIONS AND INJURIES OF THE UTERUS.

CARCINOMA OF THE BODY OF THE UTERUS.

CARCINOMA of the body of the uterus is much less commonly seen than that beginning in the cervix.

The disease does not bear that relation to intercourse and child-bearing which is so conspicuous a feature of carcinoma cervicis. Thus Leitch and Andreizen found that 25 per cent. of the married patients were sterile, whilst the proportion of married to unmarried patients was about that which obtains in the general population (five to one).

The average age at onset is fifty-one years, and in no less than 75 per cent. of the cases the menopause is either in progress or passed. The average duration of life from the onset of the symptoms to death is 1·8 years.

The disease is rare below forty-five years of age, and its frequency declines after sixty. In most of the cases the symptoms appear within the ten years following the menopause.

The antecedent conditions leading up to the disease are not so well known as in the case of the cervix, but there is good evidence that a condition of chronic endometritis, especially that variety known as "senile," is previously present in most, if not all, cases.

There is a distinct relation between the presence of myomata in the uterus and carcinoma of the corpus, the former tumours being found co-existent in an undue proportion of the cases.

PREVENTIVE TREATMENT.

In a disease occurring so comparatively rarely, and of whose antecedent conditions much has still to be learnt, the question of preventive treatment can only be imperfectly answered.

Inasmuch as myomata distinctly predispose to it, the surgical removal of these tumours, so wholly reasonable on other grounds, is still further justified.

All uterine discharges in elderly women past the menopause should be treated, especially those of a purulent or watery nature. The condition known as "senile" endometritis is frequently difficult

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to diagnose from carcinoma of the body, and is very intractable to any treatment short of hysterectomy.

The removal of the small senile uterus is usually an easy and safe proceeding, and frees the patient from the annoyance of constant discharge and the risk of subsequent carcinoma.

The vaginal route is usually the best in these cases.

CURATIVE TREATMENT.

The results of surgical measures for the cure of carcinoma of the body are very much better than those for cervical disease. This is entirely owing to the much greater accessibility of the diseased area, whereby the operation required is less extensive and difficult, for the frequency of metastatic deposits found post-mortem is much greater in the former than in the latter—75 per cent. against 45 per cent. Moreover, unlike what occurs in the cervical growth, the metastatic deposits in more than half the total number are situated in the peritoneum and viscera, and are beyond the reach of surgery.

Early Diagnosis.—For curative treatment to be successful early diagnosis is essential. It will therefore be proper to consider briefly the symptoms and signs of the disease and its distinction from other conditions resembling it.

The common early symptom is hæmorrhage associated with a watery discharge from the uterus, a particularly suggestive combination when occurring after the menopause. The amount of bleeding varies from free loss to a mere brownish discharge. In some senile cases, especially when a previous purulent endometritis has existed, the discharge may be pus mixed with varying quantities of blood. The blood and discharge can be seen to flow from the os, and are provoked by manipulation.

Pain appears earlier in carcinoma of the body than in the case of the cervix, and is of a dull aching character and situated in the lower abdomen.

Fetor, on the other hand, occurs much later, because, owing to its position, the growth does not become infected so early.

The condition of the uterus varies. Usually it is enlarged, but not greatly so unless myomata are present as well. In old women, however, it may be no larger or even smaller than normal. These differences depend on the initial size of the organ and the type of growth going on within it. Where the fungating form is present the uterus is enlarged, but in the ulcerative type the organ may be but little altered in size (Fig. 1).

In the large bulk of cases the cervix is patulous, and the finger

can often be thrust through it and the growth above it felt. Small ulcerating growths located in the upper part of the uterus do not, however, produce cervical relaxation, nor does the rare form in which a diffuse infiltration of the wall without ulceration or fungation is present.

The diagnosis may be inferential from the physical signs and symptoms, or absolute as the result of microscopical examination. An accurate inferential diagnosis can be made when the soft, friable, freely bleeding growth is accessible to the finger. In other



FIG. 1.—The fungating type of carcinoma of the body of the uterus.

cases it will be necessary to dilate the cervix under an anæsthetic, and, if necessary, to remove a portion of it by curette or forceps for microscopical examination.

Some of the most difficult cases are those in which carcinoma of the body is supervening in a myomatous uterus. It cannot be sufficiently insisted that continuous loss is not a characteristic of a uterine myoma, and that when such is present in a patient over forty-five years of age, and especially when it is associated with a watery or foul discharge, the possibility of carcinomata complicating the myoma should be gravely considered.

A myoma associated with such symptoms should always be

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removed; but if the possibility of co-existent carcinoma is overlooked, the surgeon may perform the sub-total operation and only discover the growth during the amputation. In such an event the remainder of the cervix must at once be removed, and the appendages also if they have not already been so treated. The risk of cancer-cell implantation at the moment of amputation cannot, however, be remedied if this mistake has been made. If the probability of co-existent carcinoma is recognised beforehand and a total extirpation performed, this risk will not be run.

A myoma extruding from the uterine cavity may be mistaken for carcinoma of the body, especially if sloughing. The hard consistence of the mass, coupled with perhaps the comparatively young age of the patient and the presence of other myomata, usually renders the diagnosis easy. Innocent uterine polypi, either myomatous or glandular, produce constant loss during their extrusion, but their nature will be at once detected when examined under an anæsthetic with the cervix dilated.

Some cases of chronic metritis cause continued loss. The patients are usually too young for carcinoma of the corpus. In many of them an accurate diagnosis as to the cause of the bleeding is impossible until the cervix has been dilated under an anæsthetic and the cavity explored. The finger will at once detect the smooth firmness of the uterine wall, so entirely different from the irregular friable feel of ulcerating or diffusely infiltrating carcinoma.

The cases most likely to give trouble in diagnosis are those of senile endometritis with irregular discharges of blood from the uterus. In senile endometritis the uterus is small, unless pyometra is present, the cervix is closed, and the discharge is purulent. Discharges of blood from the congested mucous membrane occasionally take place, but the occurrence is always gravely suspicious of malignant disease. No time should, therefore, be lost in exploring the uterine cavity under an anæsthetic.

Operative Treatment.—Three operative methods are open to the surgeon in dealing with a case of carcinoma of the uterine body: (1) Vaginal hysterectomy; (2) Abdominal total hysterectomy; and (3) Hystero-Vaginectomy by para-vaginal section.

(1) *Vaginal Hysterectomy.*—The technique of this operation will be described later (*see* p. 598). It is indicated in elderly and feeble cases where the uterus is but little or not at all enlarged, and the vagina is not unduly narrow and especially if the patient is very fat. It is unsuitable for cases with much uterine enlargement, either due to the growth or co-existent myomata, and it becomes difficult in elderly virgins with a shrunken and narrowed conditior

of the vagina, especially when the vaginal cervix has disappeared by senile atrophy.

Before performing the operation it is important to occlude the cervical canal by suture to prevent the escape of fragments of the growth during the operation. The appendages should, of course, be included in the removal.

(2) *Abdominal Total Hysterectomy*.—This is the method of election in all cases in which the uterus is enlarged or the vagina narrow.

The technique of the operation is as follows. The patient is first placed in the lithotomy position and the external os is closed by a suture. The vagina is then well washed out and the patient placed in the Trendelenburg posture.

The abdomen being opened in the middle line, the uterus is inspected and it and the appendages are freed from any adhesions that may be present. A search is then made for evidence of secondary growths in the peritoneum, liver or aortic glands, and if none are found the uterus is pulled up, the ovarico-pelvic and round ligaments are clamped on each side and divided, and the peritoneum over the front of the supra-vaginal cervix is divided transversely and reflected down.

The bladder is then pushed off the front of the cervix until the anterior vaginal wall is exposed.

The uterine artery on either side is now clamped just as it reaches the side of the uterus, and the tissue between the clamp and the uterus is divided towards the vagina. The vagina is now opened through its anterior wall, and the vaginal cervix is seized and drawn out of the incision. Continuing to pull the cervix upwards and backwards, the operator now divides the remaining attachments of the uterus at its lateral and posterior junction with the vagina.

The uterus being removed, the uterine and lateral vaginal vessels are secured by separate ligatures, and the ovarico-pelvic and round ligaments on either side are similarly dealt with. All other bleeding having been arrested, the anterior peritoneal flap is then sutured to the cut edge of the peritoneum covering the backs of the broad ligaments and the front wall of Douglas's pouch. The upper end of the vagina is left open except for this peritoneal covering. The abdominal wound is then closed in the usual way.

This technique may be modified, the vagina being opened posteriorly, a manœuvre facilitated by placing a large-size uterine dilator in the vagina and cutting on to it. The method described above is, however, that most generally useful.

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(3) *Hystero-vaginectomy by Para-vaginal Section.*—The technique of this operation is fully described below (see p. 611). There is only one set of circumstances in which it is indicated as a treatment

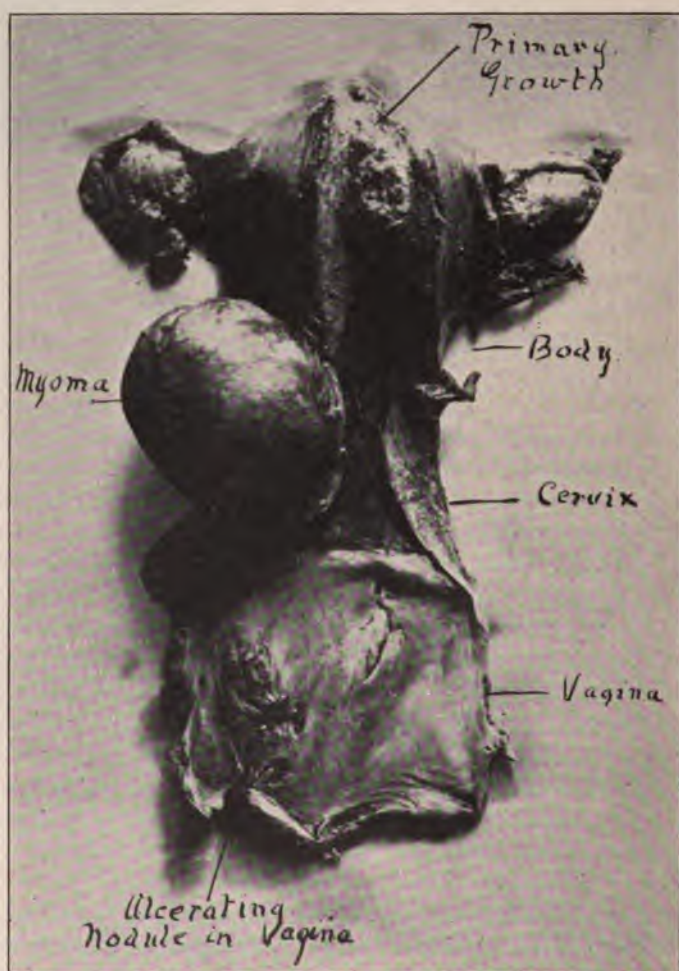


FIG. 2.—Carcinoma of the uterine body with a secondary nodule in the vagina, removed by hystero-vaginectomy by para-vaginal section.

for carcinoma of the uterine body, namely, when, in addition to the primary growth in the uterus, a secondary nodule is present in the lower half of the vagina.

Such a condition might be considered as hopeless, but I had a patient alive and free from recurrence for nearly two years after

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this operation, a lesson that it is impossible always to prognosticate the ultimate results of an operation for carcinoma. Certainly when no contra-indication on other grounds exists to the removal of the uterus and the vaginal nodule is small and limited to the vaginal wall, the operation is fully justified (Fig. 2).

Limits of Operability and Ultimate Results.—Secondary peritoneal, visceral or glandular growths, of course, contra-indicate an operation, as does extensive infiltration of the broad ligaments. In all other cases the removal of the uterus is the proper course.

The ultimate results of these operations are, on the whole, very good, probably between 50 and 60 per cent. being permanently cured. Those cases in which a large myomatous tumour co-exists are probably the most favourable, because the malignant growth for a while tends to be limited by the mass around it.

VICTOR BONNEY.

CARCINOMA OF THE CERVIX.

Of the various varieties of malignant disease to which the uterus is liable, carcinoma of the cervix is by far the most common.

The disease is peculiarly related to the genital functions, intercourse and childbearing. Of 1,876 in-patients of the Middlesex Hospital Cancer Wards suffering from carcinoma of the cervix, and analysed by Leitch and Andreizen, no less than 95·4 per cent. were married women and only 9 per cent. were sterile.

The mean age of onset was found to be 44·63 years, whilst in 68 per cent. of the cases the disease began in the age period between 35 and 55 years.

MacCormac, also working in the Middlesex Hospital Cancer Research Laboratories, showed that if the number of women surviving at each age period out of 100,000 females born alive is also taken into account, the greatest liability to the disease occurs between forty and fifty-four, and reaches its absolute maximum at the latter age.

PROPHYLAXIS.

According to the Registrar-General's returns, one in every eight women over the age of thirty-five years is fated to die of malignant disease of some kind or other. Carcinoma of the cervix will probably account for some 10 or 15 per cent. of those thus dying. The importance, therefore, of finding some means of preventing this terrible penalty of marriage and childbearing is very great.

The reasons for this relationship formed part of the Hunterian lectures delivered by me at the Royal College of Surgeons in 1908. I then showed that every case of carcinoma of the cervix was preceded by the series of inflammatory phases collectively known as "erosion" of the cervix.

In a work exclusively dealing with treatment it is not necessary to go into the pathological details on which I based this conclusion, but it will suffice to say that as a result of long-continued inflammation an accession of cellular energy takes place first in the sub-epithelial tissue and later in the epithelium itself. These states of cellular activity and reproduction subsequently decline in the same order and give place to ones much below the normal. A condition of rarefaction and cellularity of the sub-epithelial tissue is an

important factor promoting epithelial ingrowth, and in all chronic inflammations affecting an epithelial surface the period at which the hyperactive states of both species of cells coincide is that most favourable to the producing of malignant epithelial ingrowth.

In an "erosion" of the cervix this period is reached as the "papillary" or "glandular" stage is passing into the "follicular" stage. In the prevention of the disease, therefore, attention must be directed to the pre-carcinomatous cervicitis that leads up to it.

Cervical laceration of some degree occurs in most first labours. In these days every perineal laceration is at once sutured, but the same rule does not apply to the cervix. I am, however, of opinion that the time will come when no labour will be considered as adequately conducted in which a cervical laceration of any considerable depth is not at once closed, for although "erosions" occur in virgins yet it is very rare for them to undergo carcinomatous transformation. Thus it would appear that traumatic laceration in addition to chronic inflammation is a factor in the etiology.

Lazarus Barlow has suggested that the irritation of the semen plays an important part in the production of the precarcinomatous cervicitis.

The practice of antiseptic douching after labour till all discharge has ceased is of great importance, for many a cervicitis initiated in the puerperium is the direct antecedent of the growth that kills the patient years afterwards.

There can be little doubt that carcinoma of the cervix is much commoner amongst the lower classes than amongst the upper, because of the superior medical supervision the latter are able to command.

Every married woman over thirty years of age who suffers from chronic cervicitis carries in her the potential antecedent of carcinoma of the cervix, just as every man with chronic superficial glossitis is liable to malignant disease of the tongue. This is recognised in the latter case, and the importance of avoiding and treating the antecedent disease is admitted. But carcinoma of the cervix up to the present time is generally regarded, in spite of the facts I have stated, as an "act of God."

It is incumbent to impress upon married women that persistent leucorrhœal discharge should at once be attended to. Chronic cervicitis when in its earlier phases is successfully treated by scraping with a sharp spoon, but in its later is best dealt with by excision of the menacing area, either by the operations of tracheloplasty or

circular amputation of the vaginal cervix. These operations are simple, practically devoid of risk, and permanently remove a very definite "danger zone."

THE DIAGNOSIS OF CARCINOMA OF THE CERVIX.

The Importance of Early Diagnosis.—For curative treatment to be successful early diagnosis is of the greatest importance, for though, as will be shown, modern surgery has immensely extended the scope of curative treatment, yet the ultimate prospect of cure as well as the immediate progress of the operative measures employed bears a direct relation to the period at which the case first comes under notice.

A. Leitch from a study of cases of carcinoma of the cervix, none of which had been submitted to surgical measures, found that the average life-expectation from the earliest appearance of symptoms to death was one year nine months.

Owing to the fact that the early stages of the disease are painless, and at most only associated with the discomfort due to continued vaginal loss, women, especially of the lower classes, neglect to seek advice until the disease is well advanced. This lamentable neglect is encouraged by the widespread belief that the age period approaching the menopause is normally associated with irregular or continued bleeding from the uterus.

If the clinical histories of a number of hospital patients with carcinoma of the cervix are studied, it will be found that the vast proportion did not seek advice until the symptoms had lasted from three to six months. On questioning these women as to the reason for this delay, one of three answers is invariably given: "I didn't think it could be much as I had no pain," or "I thought it was the change, sir," or "I was afraid."

In the treatment of carcinoma of the cervix, therefore, the first problem to be solved is how best to educate the public to understand the importance of taking medical advice at the earliest appearance of the symptoms. It is a subject fraught with difficulties. On the Continent, especially in Germany, very vigorous methods have been employed, including the distribution of printed circulars and the publication in lay journals of brief accounts of the disease couched in words easily understandable by the laity. In England no direct appeal to the populace has been made, but the British Medical Association has circularised all doctors and midwives on the subject.

Next in importance to the education of womankind in an understanding of the possible significance of unusual uterine loss

is the enforcing on the medical profession of the urgent need of immediately investigating the cause of all irregular genital hæmorrhages, especially in married women over thirty-five years of age.

It is unfortunately still all too common to meet with patients who have been treated with styptic drugs over many months before the cause of the bleeding was sought for by vaginal examination. A medical man who pursues such practice gravely fails in his duty to his patient.

The Order of the Symptoms.—In the vast bulk of cases hæmorrhage is the first symptom of the disease. Its onset is insidious, being perhaps scanty and irregular at first, and provoked by movement, straining, douching and coitus. It soon, however, becomes continuous, and at times may be very excessive.

Shortly after the onset of the bleeding a watery discharge is noticed. The discharge is not immediately offensive, but becomes so after a variable period; in some cases within three months, but in others not till the best part of a year has elapsed. Pain is much longer deferred as a rule, rarely beginning until the bleeding and discharge have been going on for many months. It is peculiarly distressing, being continuous and gnawing in character and referred to the sacrum, the back of the thighs and the vagina.

This pain used to be considered as evidence that the growth had spread back and involved the sacral nerve trunks. The investigations rendered possible by the modern extensive operations have shown that this conception has no basis in fact. Growth as extensive as this is very rarely met with. The pain described is due to tension in the tissues of the cervix by the infiltrating growth, and at once disappears after its removal. It is more marked and occurs earlier in the massive infiltrating form of the disease than in the ulcerating forms.

In the later stages of the disease, when extension has occurred into the pelvic cellular tissue, pain is complained of down the front and inner side of thigh, and tenderness and pain may be present over the lower abdomen, partly due to the cellular tissue infiltration and partly due to salpingitis secondary to the septic cervix.

Exceptionally little or no bleeding occurs until the disease is advanced. In such cases a foul, watery discharge may be the first symptom noticed, or the patient's attention is first attracted by more or less obscure pains in the pelvic region.

The Appearance of very Early Carcinoma of the Cervix.—Really early carcinoma of the cervix, say within a month of its

initiation, is so exceedingly rarely seen that many practitioners can have no idea what it looks like.

In this connection it is most important to remember that carcinoma of the cervix is always a condition superimposed in chronic cervicitis and "erosion," and that, therefore, in all early cases signs of chronic cervicitis will be present as well. This is not so in the later phases, because the neoplasm involves the whole of the previously chronically inflamed area.

A cervical erosion is the outward and visible sign of chronic inflammation of the cervical canal, and passes through various stages according to the duration and severity of the process.

The earliest of these is the "granular" erosion, which presents a very slightly depressed red area with a finely granular surface. This passes on to the glandular "erosion," in which many new glands are formed by downgrowth from the basal layers of epithelium that cover the surface of the granular erosion, whilst the pre-existent glands of the cervical mucosa become much hypertrophied. The surface of the glandular erosion is slightly raised, red and "velvety." In some cases the surface is thrown into definite "pile-like" elevations, produced by tissue-cell multiplication under the epithelium (papillary erosion).

The glandular and papillary phases are subsequently succeeded by the stage of "follicular erosion," in which the epithelium over the involved area thickens greatly and becomes many layered and stratified. The ducts of the hypertrophic glands, both original and newly formed, become occluded and form cysts ("ovules of Naboth"), and the surface becomes whitish (leukoplakic), whilst studded over it are many bluish elevations corresponding to the retention cysts beneath.

The liability to carcinomatous transformation is greatest towards the end of the glandular and the beginning of the follicular stage, because it is at this period that a high degree of cell activity of the surface epithelium and the sub-epithelial tissue-cells coincide.

Carcinoma of the cervix is almost invariably of the squamous cell variety (epithelioma), and is initiated by continued down-growth of certain of the inter-papillary epithelial processes that are always formed as the result of the epithelial hypertrophy which occurs in the later stages of cervical erosion.

It therefore follows that in a really early case of carcinoma of the cervix the neoplasm will be seen co-existing with an "erosion." In those which I have seen the growth at its inception takes the form either of a small reddish elevation which bleeds readily, or of

a small, somewhat sharply-cut ulcer. Beyond the area of the incipient neoplasm extends that of the erosion.

An appreciation of these facts is most important, because in all text-books the distinction between an "erosion" and carcinoma of the cervix is made a great point of. But the fact is that a hard-and-fast distinction is impossible, because the former condition is the invariable precursor of the latter, and it is possible to get phases in



FIG. 1.—Carcinoma of the cervix. The excavating type from a specimen removed by the radical abdominal operation.

the transformation when nothing short of microscopic investigation will decide whether malignancy is present or not.

The Signs of Established Carcinoma of the Cervix.—It is very exceptional for carcinoma of the cervix to produce a mass sufficiently large to be felt from the abdomen. Occasionally, however, a swelling due to diffuse cancerous lymphangitis of the broad ligaments may be present. It is fixed and indurated, and resembles the swelling of broad-ligament cellulitis, except that it is but little or not at all tender.

The diagnosis of the disease therefore rests almost entirely on the results of vaginal examination.

Carcinoma of the cervix when established presents itself in various forms, which may be roughly classified as follows: (1) the excavating form; (2) the fungating form; (3) the diffused indurative form; and (4) the senile atrophic form.

(1) *The excavating form of the growth* is that most common



FIG. 2.—Carcinoma of the cervix. The fungating type, from a specimen removed by the radical abdominal operation. There is a second nodule in the vaginal wall.

met with. In a typical case the vaginal cervix has disappeared and its place is taken by a deep ulcer, whose edges are indurated but friable. The wall of the ulcer is irregular and discharges from it usually very foul, and examination provokes more or less bleeding (Fig. 1).

(2) *The fungating form* reaches its maximum development in the so-called "cauliflower mass," in which the vaginal

an irregular-surfaced tumour, hard but friable, and usually bleeding freely and exuding a fetid discharge. The typical cauliflower mass is rare, but lesser degrees of the fungating form of growth are very common, and may co-exist with extensive ulceration, so that whilst the centre of the growth is occupied by a deep excavation, its periphery sprouts out in irregular protuberances, greatly enlarging the vaginal cervix (Fig. 2).

(3) *The diffuse indurative form* is of great importance, because of the frequency with which the condition is not recognised until too late. In this form the whole cervix is much enlarged, and feels hard and heavy. The mucous membrane covering the vaginal



FIG. 3.—Carcinoma of the cervix. The diffuse infiltrative type, from a specimen removed by the radical abdominal operation.

aspect is not, however, ulcerated except in the immediate vicinity of the external os, so that inspection with the speculum may show little but an enlarged, rather bluish-looking cervix, from the external os of which, a steady trickle of blood is going on (Fig. 3).

(4) *The senile atrophic form* is seen in elderly women the possessors of a senile uterus. The vaginal cervix has undergone age atrophy and has disappeared. Its place is taken by a puckered depression in the vaginal vault, the edges of which may feel a little rough and friable, whilst manipulation provokes a free flow of blood. This, again, is a condition very apt to be overlooked or to be wrongly interpreted.

Differential Diagnosis.—Bearing in mind the subject-matter of the last two sections, it is seen that carcinoma of the cervix has

to be diagnosed from other ulcerative and proliferative conditions of the cervix.

Of these the changes due to chronic cervicitis are by far the most important. As has been shown, the gradation between cervical erosion and carcinoma is so insidious that in many cases it is impossible to say by inspection or touch whether or not early carcinoma is present.

Of all the signs pointing to carcinoma, a marked tendency to bleeding is by far the most suggestive.

Cervical erosion does not show this tendency, although rough manipulation may evoke a little oozing. Carcinoma, on the other hand, bleeds on the slightest provocation, and therefore all apparent erosions which can be made to bleed with gentle manipulation should come under suspicion of incipient malignant transformation. Cases like this should be treated by *excision of the suspected area for purposes of microscopical investigation*. Several sections should be cut from different parts of the removed tissue to minimise the possibility of overlooking the point at which malignancy is starting.

If definite ulceration or excavation is present, the diagnosis is much easier. The only inflammatory condition producing such destruction is the rare one of tuberculous cervicitis. Most of the examples recorded have been mistaken for carcinoma. Its true nature will be revealed by the microscopic examination which should be the routine before any case of assumed carcinoma of the cervix is submitted to radical operation.

Apart from this the rugged-edged excavation with walls hard yet friable, which bleeds freely on examination, can scarcely be mistaken for anything else.

When fungation is present the tumour formed may be mistaken for a myomatous or mucous polyp, growing from or extruding through the cervix, or for hypertrophy due to chronic cervicitis or the congestion caused by old-standing prolapse.

When the mass is large, a chronically inverted uterus may be suggested. A carcinoma of the body of the uterus presenting through the external os may be mistaken for a cervical growth.

In regard to the diagnosis from polypoid tumours extruding through the cervix, investigation shows that these are surrounded by the ring of the external os and have no connection with the cervix. In texture an extruding myoma or large mucous polyp is smooth and firm, except in the case of necrotic tumours.

Myomatous or mucous polyps growing from the cervix have not the friable consistency of carcinoma, but are more smooth and

tough, and in the case of a myoma even hard manipulation does not cause bleeding; further their stalked attachment is very evident. Myomata may be sessile in the vaginal cervix, but they are covered by the normal smooth mucosa, and do not in the least resemble the irregular-surfaced and patchy, red-coloured carcinoma.

The hypertrophied cervix of chronic cervicitis and prolapse may be more suggestive, and the difficulties of distinguishing some erosions from early carcinoma have already been referred to. The enlargement, however, is general in distribution, though it may be more marked in one or other lip. It is firm in consistence and tough like hard indiarubber.

On a chronically prolapsed cervix ulcers may be found due to friction of the clothes or thighs. These ulcers may resemble malignant growth to a degree, but their base is smooth and their edges rounded and "callous," nor do they show any marked tendency to bleed. It is extremely rare for them to become carcinomatous.

An inverted uterus protrudes through the os like a polyp. Its surface may be ulcerated and hæmorrhagic, suggesting carcinoma, but careful bi-manual examination and the passage of the sound will always distinguish the condition.

The diffuse, indurative form of carcinoma of the cervix is difficult to diagnose, because little is to be seen or felt strikingly distinctive of the disease. The cervix has a peculiarly hard, heavy, fixed feel, but the most suggestive point is the bleeding which examination provokes. Such a case should be examined under an anæsthetic, and a piece of the cervix excised and examined microscopically.

The senile atrophic form is again likely to cause difficulty. In many of these nothing abnormal is to be felt or seen on examination except a persistent blood loss from the puckered depression representing the cervix. Here, also, an examination under an anæsthetic is essential, for such bleeding may be due to carcinoma beginning in the body or cervix, while senile endometritis is occasionally the cause of bleeding from an old woman's uterus. The distinction between these three conditions is of the greatest importance from the point of view of treatment, and in many cases the microscope can alone decide.

THE OPERATIVE CURE OF CARCINOMA OF THE CERVIX.

The diagnosis of carcinoma of the cervix having been established, the feasibility of removal of the growth has next to be considered.

For a full appreciation of the nature of the task that confronts the surgeon a consideration of certain aspects of the disease from the standpoint of pathology is necessary.

The advance of a carcinomatous growth takes place in two ways: first, by a gradual pressure destruction of the tissue surrounding it, "growth by infiltration"; and secondly, by insinuation of the cells along trunk lymphatic vessels, termed by Handley "permeation."

The distinction between these two methods of extension is very important.

Infiltration is a comparatively slow process, and is occurring all round the periphery of the tumour. The macroscopical growing edge of a carcinoma is well defined, and microscopically shows an abrupt line of demarcation between the growth on the one side and the uninvaded tissue on the other.

The best example of growth by infiltration alone is a rodent ulcer, and had we only to deal with this method of extension in carcinoma it would be possible, as in the former condition, to permanently remove it by an incision just outside its abrupt macroscopical margin.

Growth by permeation, on the other hand, is a much more rapid process, but is limited to certain definite tracts corresponding to the lines of lymphatic drainage of the involved area. It is to this method of extension that the metastatic growths in lymphatic glands and distant organs are due, and in virtue of the possession of which the tumour owes its sinister character.

Applying these general considerations to carcinoma affecting the cervix, it is seen that the distinction between growth by tissue infiltration and that by lymphatic permeation is well defined. Thus the rectum and bladder are involved in the growth by infiltration, the short distance intervening between them and the cervix being only spanned after the lapse of a year or more. The much more distant iliac glands, on the other hand, are invaded by lymphatic permeation in a few months.

The frequency of occurrence of metastatic nodules varies in carcinoma in different parts of the body, and it is a remarkable fact that, of all the common sites of carcinoma, that occurring in the cervix is least frequently of all associated with secondary growth.

Thus Archibald Leitch, analysing 915 cases at the Middlesex Hospital Cancer Research Laboratories, found that of those dying of the disease only 45 per cent. had metastatic growths, whilst irremovable visceral deposits were present in less than half of these, the rest being made up of glandular metastases.

MacCormac, working in the same laboratories on another series,

found metastases capable of demonstration by the microscope in only 44.5 per cent., of which again less than half were visceral.

These findings agree with the results obtained by my colleague, Comyns Berkeley, and myself in a series of seventy-five radical abdominal extirpations, only slightly over 30 per cent. of the cases being found at the operation to have the regional glands carcinomatous.

This comparative rarity with which metastatic growth occurs in carcinoma of the cervix is in striking contrast with the same disease occurring in the breast, in which only 6.5 per cent. of the patients so dying are found to be free of secondary growth.

It is thus seen that more than half the persons dying of cervical carcinoma succumb to a purely local disease.

From the standpoint of pathology, then, the cervix is the most favourable situation for the surgical cure of carcinoma of any of the common sites of the disease. Anatomical considerations, however, show that the eradication of the disease is difficult on account of the immediate proximity of the bladder, rectum and ureters, the numerous large blood-vessels situated on the side walls of the pelvis, and the fact that the operation area can only be reached through a deep hole from above or a narrow passage from below.

Granted that the surgeon can successfully surmount these anatomical difficulties the prospect of cure is good.

Operations for the Cure of Carcinoma of the Cervix.—There are four operations at present practised for the cure of carcinoma of the cervix: (1) Vaginal hysterectomy; (2) Total abdominal hysterectomy; (3) Hystero-vaginectomy by para-vaginal section; and (4) Radical abdominal hystero-vaginectomy. Each of these operations will now be considered in detail.

VAGINAL HYSTERECTOMY.

Technique of the Operation.—*Instruments Required.*—Auvard's self-retaining speculum, a long, narrow vaginal retractor, scalpel, blunt-pointed scissors, eight Spencer Wells forceps (7 inches long), volsellum: two ring forceps, dissecting forceps: six curved needles (four No. 7, two No. 13): Worrall's notched needle, silk, No. 4 and No. 2.

Steps of the Operation.—The patient having been fixed in the lithotomy position, the vagina is well douched. The growth should then be cut away with scissors until firm tissue is reached, when the cautery is applied and the vagina again douched.

A strong ligature is now passed right through the cervix and tied, the ends being left long to act as a tractor.

The cervix being pulled down and the limit of the bladder on its anterior surface being defined with a sound if necessary, the mucosa covering the cervix is circumcised just below this level (Fig. 4).

The bladder is now pushed and dissected off the front of the

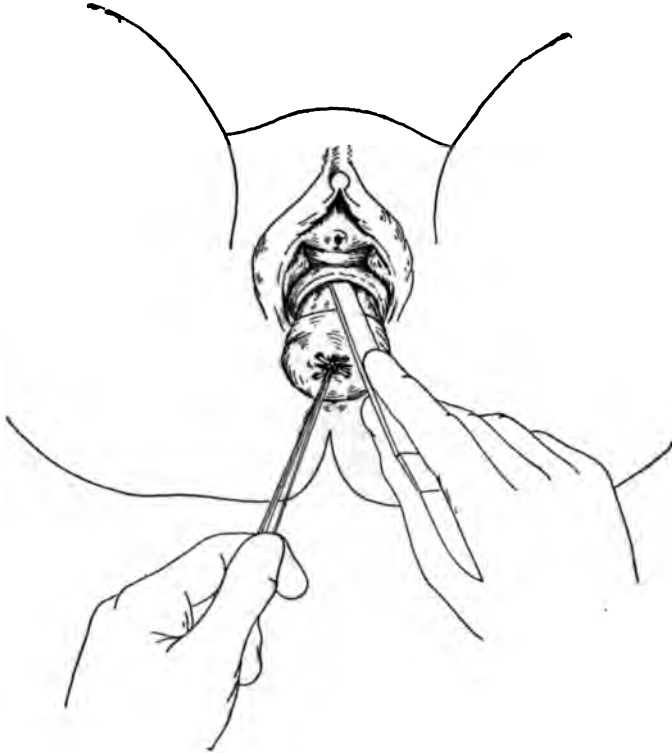


FIG. 4.—Vaginal Hysterectomy. Reflecting the mucous membrane. (From Berkeley and Bonney's "Textbook of Gynecological Surgery." Cassell.)

cervix until the peritoneum at the bottom of the utero-vesical pouch is reached. The pouch is then opened (Fig. 5).

The cervix now being pulled well forward, the incision posteriorly is extended by pushing the mucosa off the back of the vaginal cervix until the vault of the vagina is reached. This is incised until the pouch of Douglas is opened. The finger is introduced into the peritoneal cavity, and any adhesions at the back of the uterus are broken down (Fig. 6).

The uterus is now retained by the folds of the broad ligament of either side. The cervix being still further pulled down, the pulsations of the uterine artery on one side are felt for, and, being

detected, the base of the broad ligament is transfixed just above the artery and a ligature passed, which when tied below controls the vessel (Fig. 7). This being effected, the attachment of the uterus to this section of the broad ligament is divided with scissors close to the uterus and distal to the ligature (Fig. 8). The same proceeding is then carried out on the opposite side.

The mobility of the uterus is now much increased, and it can be

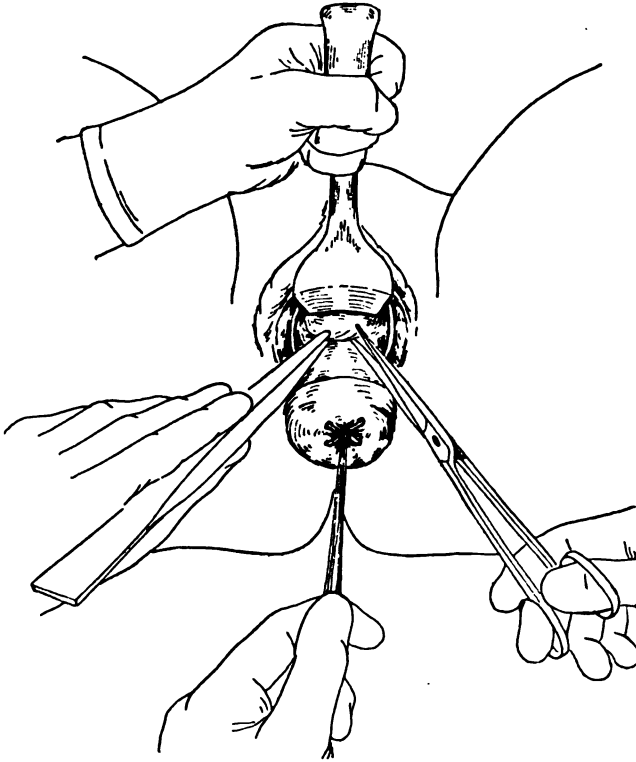


FIG. 5.—Vaginal Hysterectomy. Opening the utero-vesical pouch. (From Berkeley and Bonney's "Textbook of Gynecological Surgery." Cassell.)

pulled further down until the upper parts of the broad ligaments become accessible. These are transfixed in their turn and ligatured in halves, the upper half of the ligature surrounding the ovarico-pelvic ligament and ovarian artery outside the ovary, and the lower half securing the round ligament. The ligatures being tied on one side, the uterus is separated on the distal side of the ligatures (Fig. 9), and similar proceedings having been carried out on the other side, the removal is completed.

In some cases the upper part of the broad ligament is more conveniently made accessible by anteflexing the fundus into the

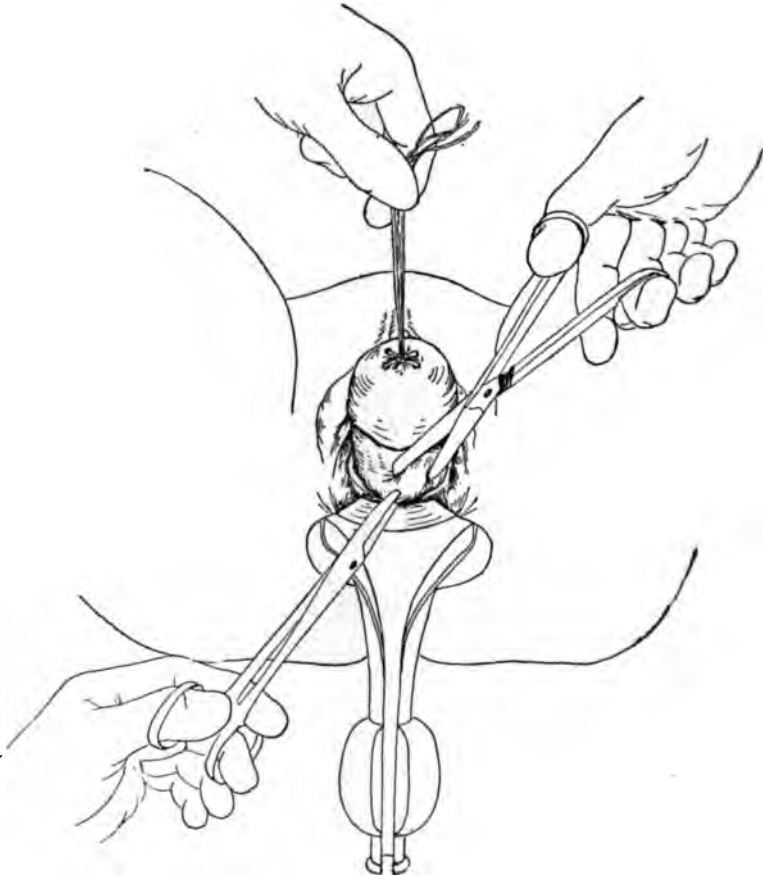


FIG. 6.—Vaginal Hysterectomy. Opening the utero-rectal pouch. (From Berkeley and Bonney's "Textbook of Gynæcological Surgery." Cassell.)

vagina through the opening at the bottom of the utero-vesical pouch.

The uterus being removed a search is made for bleeding points, and additional ligatures are applied as may be necessary.

The ends of the ligatures previously left long to act as tractors in case of need on the cut edges of the broad ligaments are now cut short, and sterilised gauze is packed into the opening in the vault of the vagina to prevent prolapse of intestine.

After-treatment.—The gauze is removed in twenty-four hours,

and the usual after-treatment of a case of *cœliotomy* is proceeded with. The ligatures not infrequently become infected, a foul discharge occurring in the second week. Douches should not, however, be allowed until at least a week after the operation, and then they should be administered at low pressure.

Immediate Results of the Operation.—The convalescence from vaginal hysterectomy is usually rapid, and very little shock

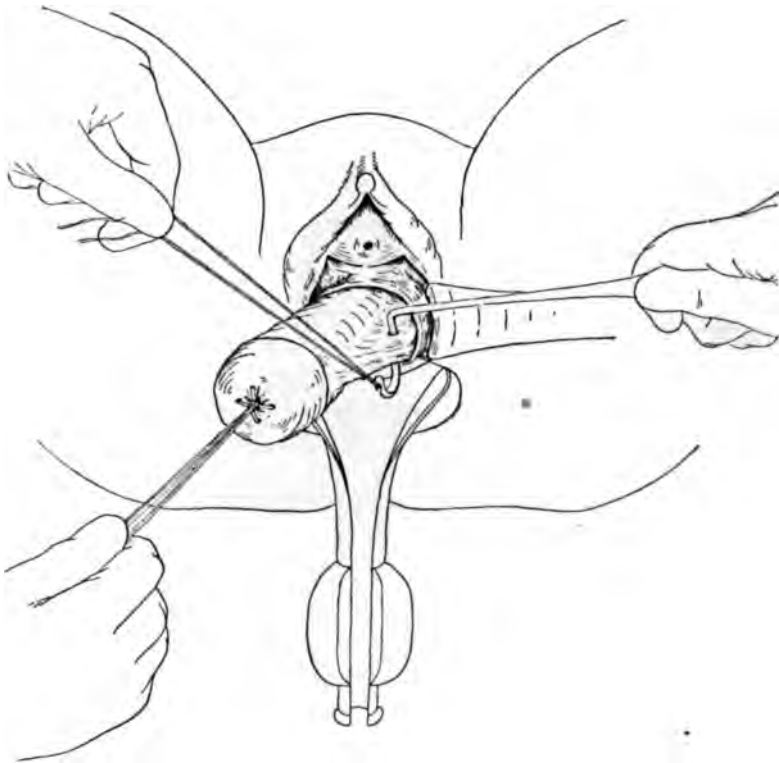


FIG. 7.—Vaginal Hysterectomy. Transfixing the lower part of the broad ligament. (From Berkeley and Bonney's "Textbook of Gynæcological Surgery." Cassell.)

ensues even after a prolonged operation. The mortality varies in different statistics, and depends chiefly upon the advancement of the disease at the time the operation is undertaken. In general it may be taken at about 7 per cent. in English practice, though figures as high as 14 per cent. obtain in some Continental statistics.

Limits of the Operation and Percentage Operability.—Vaginal hysterectomy is only suitable for a small proportion of

patients suffering from carcinoma of the cervix. To secure a reasonable chance of permanent cure, or even to permit of the operation being carried out at all, it is necessary that the growth should be limited to the cervix. Extension to the broad ligaments, utero-sacral ligaments or vaginal vault forbids the operation. Further, it is necessary that sufficient vaginal cervix should exist to

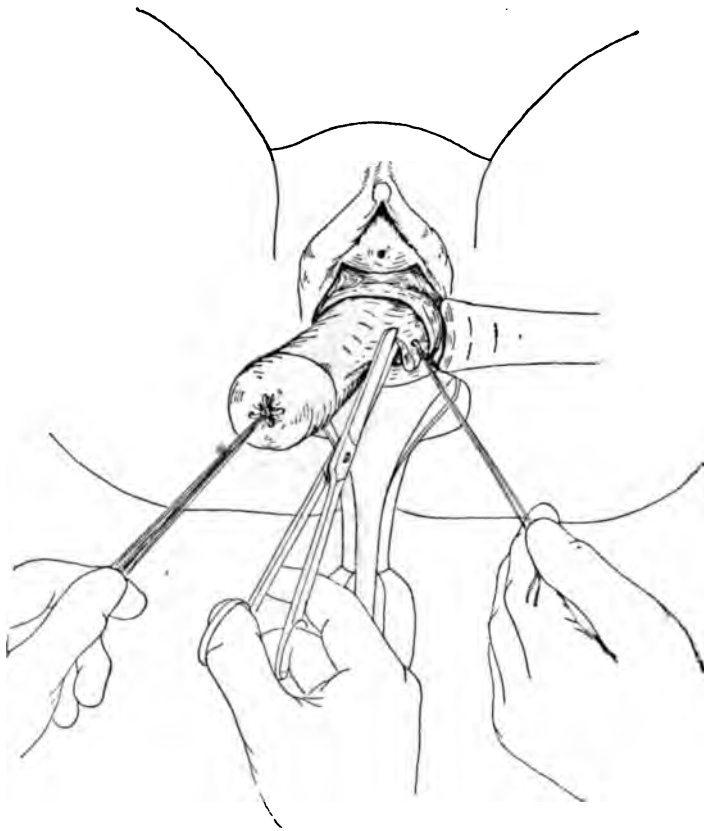


FIG. 8.—Vaginal Hysterectomy. Division of the lower part of the broad ligament. (From Berkeley and Bonney's "Textbook of Gynaecological Surgery." Cassell.)

secure a hold of it in order to pull the uterus down; thus some aged patients from the absence of the vaginal cervix by senile atrophy are unsuitable for the operation.

Thus only early cases of the disease can be dealt with by vaginal hysterectomy. The number of patients capable of being operated upon by a particular method out of every hundred that present themselves for treatment is known as the *operability rate*. In the

case of vaginal hysterectomy for cervical carcinoma this rate may be taken at somewhere between 12 and 15 per cent.

Ultimate Results.—The ultimate results of the operation are very disappointing, as can be seen by a perusal of Comyns Berkeley's statistics.¹ Thus Jacobs had 1·2 per cent., Gusserow 2·5 per cent., Olshausen 6·6 per cent., Leopold 8·2 per cent.,

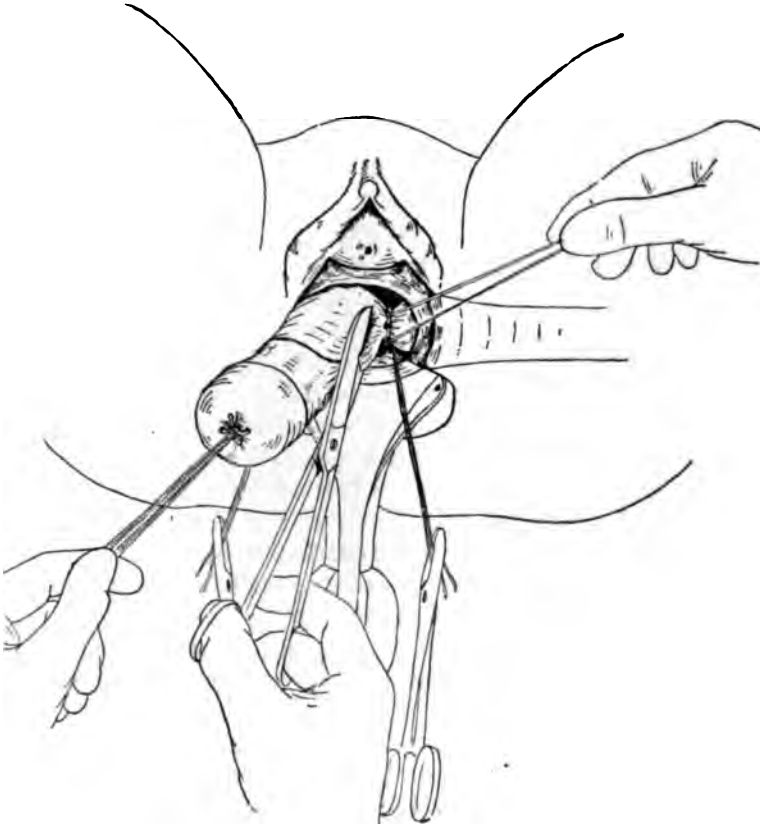


FIG. 9.—Vaginal Hysterectomy. Dividing the upper part of the broad ligament.
(From Berkeley and Bonney's "Textbook of Gynæcological Surgery." Cassell.)

Doderlein and Pozzi 9 per cent., and Pollosson 12 per cent. of patients living after five years, so that these figures, drawn from many hundreds of cases, show that not one-tenth of the cases operated on are ultimately cured. Certain English surgeons, such as Spencer (24 per cent.) and Lewers (16 per cent.), have had results much better than these, but the statistics are founded on a much smaller number of cases.

The vast bulk of recurrences occur in the first year; thus Winter out of 148 cases had 115 recurring in the first year.

In almost all the cases the recurrence takes place in the vaginal scar, showing either (1) that the primary removal was incomplete, or (2) that cancer infection of the wound occurred during the operation. Each of these requires further consideration.

Incomplete Removal.—It is impossible to be sure by clinical examination whether or not the parametrial tissues are invaded by the growth. A hard parametrium may contain no growth, the induration being purely inflammatory, whilst a soft one may be full of cancer cells. Thus Wertheim found that in 22·5 per cent. of his cases the parametrium though soft was carcinomatous, and that in 14 per cent. where it felt quite hard no cell-infection had taken place.

Routine examination of the parametrial tissues removed with the uterus by one of the modern radical methods has been carried out by several surgeons. Their results show that in at least half the cases they are carcinomatous.

These figures are largely drawn from cases in which vaginal hysterectomy would be impossible, and a lower figure, say, 20 to 30 per cent., is a probable estimate for comparatively early cases. One may assume, therefore, that in this proportion of cases treated by vaginal hysterectomy the operation is forefated to fail.

Cancer-cell Infection of the Operation Area.—During the manipulations necessary to the operation the risk of transferring living cells from the tumour to the raw surfaces of the operation area is very great. It is minimised by previously scraping and cauterising the growth, and some surgeons, notably Spencer, have still further sought to avoid it by incising the tissues with the cautery knife.

In spite, however, of such precautions the possibility remains a considerable one, and it is to this, quite as much as the chance that the parametrium is already invaded, that the early recurrence so common after vaginal hysterectomy is due.

TOTAL ABDOMINAL HYSTERECTOMY.

Total abdominal hysterectomy, in which the removal is limited to the uterus, has but little advantage over vaginal hysterectomy, because on account of the proximity of the ureters the excision has to be effected close to the carcinomatous area, and all the lower part of the parametrium is left behind. Thus the risk of incomplete removal is run as in vaginal hysterectomy.

Moreover, as no special device is possible to exclude the vaginal

surface of the cervix from the operation area, cancer-cell implantation is very likely to take place.

The operability rate is somewhat larger than that of vaginal hysterectomy, because it is possible to ascertain when induration of the broad ligaments is due not to carcinoma but to the mass formed by chronic salpingitis.

An advantage of the operation over vaginal hysterectomy is the opportunity it gives of examining the regional glands, and further, it is an easier procedure when from virginity or senility the vagina is very narrow.

On the whole, however, total abdominal hysterectomy, where the excision is limited to the uterus and adnexa, has much the same value in the disease as the vaginal operation already described, *i.e.*, it is only feasible in early cases, and even in these does not hold out great hope of ultimate cure.

The technique of total abdominal hysterectomy was described when the treatment of carcinoma of the body was discussed, and we shall now pass on to consider the modern radical operations which endeavour to meet the two main risks of extirpation of cervical carcinoma, namely, (1) incomplete removal, and (2) cancer-cell implantation.

THE RADICAL ABDOMINAL OPERATION (WERTHEIM'S OPERATION).

The modern radical abdominal operation for carcinoma of the cervix consists in removing the uterus and its appendages, and by means of clamps a sufficient amount of vagina to form a bag in which the diseased cervix can be encapsuled. In addition, the adjacent parametric and para-vaginal tissue is removed, together with as many of the regional glands as may be possible.

This extensive proceeding was suggested by Ries in 1895, and first carried out by Clark in 1896, at Johns Hopkins Hospital. It is, however, to Wertheim that the popularisation of the operation is due, for in the face of much opposition and early disappointment he persisted in its practice until he evolved a reliable technique yielding results as regards ultimate cure far in advance of anything up to that time achieved.

The principal improvement in the operation which he has introduced is the principle of clamping the vagina above the line of contemplated amputation, by which means the growth is removed in a closed capsule and the risk of cancer-cell implantation is obviated.

The Operation from the Standpoint of Pathology. The

object of the operation is to perform an excision so wide as to include with the primary growth the principal tracts of possible lymphatic permeation.

The comparative infrequency (45 per cent.) with which metastasis by lymphatic conduction occurs in carcinoma of the cervix has already been alluded to. The researches of Leitch and MacCormac already alluded to, show that in persons dying of the disease secondary growth in lymphatic glands as found post-mortem is chiefly limited to the lumbar and pelvic groups, the former being the commoner.

The experience gained from the cases of the radical operation performed by my colleague, Comyns Berkeley, and myself indicates that the glands first affected are those lying in the parametrium along the uterine artery, those situated in the obturator foramina, and particularly those lying between the external iliac artery and vein.

The parametrium itself is infiltrated in about 60 per cent. of the cases, according to Wertheim, Schauta and other Continental observers.

The operative investigations of my colleague and myself show that lymphatic permeation of the parametric tissue proceeds along one of two routes : firstly and most commonly, directly outwards to the side wall of the pelvis, and upwards over the brim to the external iliac glands ; and secondly, backwards, outwards and downwards in the substance of the utero-sacral ligaments.

These two lymphatic tracts continued upwards unite in the lumbar region, so that the glands there are doubly open to invasion, this explaining the superior frequency of their involvement found post-mortem by Leitch and MacCormac.

Besides these two common routes of lymphatic permeation, others occasionally occur. Thus secondary nodules in the vaginal wall, or glandular nodules in the pre-sacral regions, are sometimes found.

Technique of the Operation.—The object of the operation is to effect an ablation so wide that whilst at all points it lies well outside the macroscopic margin of the growth, it in addition embraces as great a length as possible of the lymphatic tracts, along which permeation commonly occurs.

It is impossible thus widely to excise the growth without first displacing the ureters, which, from their proximity to the cervix, would be endangered unless this were done. The steps of the operation are as follows.

The cervical growth, if exuberant or foul, is freely scraped away until firm tissue is reached. This may be done some days before

the radical operation, the vagina being in the meantime rendered as clean as possible by frequent antiseptic douching, but as a rule it is best performed immediately before the major operation the vagina being then packed with gauze to abort any further discharge.

The abdomen being opened, the ovarico-pelvic and round ligaments of either side are ligated and divided close to the pelvic wall, and the peritoneum on the front of the uterus having been divided, the bladder is separated from the front of the supra-vaginal cervix by scissors and swab pressure.

The vaginal wall being exposed, the ureter on one side is searched for, as it runs on the peritoneum covering the side wall of the



FIG. 10.—Wertheim's operation. Identifying the ureter. (From Berkeley and Bonney's "Textbook of Gynecological Surgery." Cassell.)

pelvis and the posterior aspect of the broad ligament (Fig. 10). The conduit being defined, the uterine artery on that side is ligated and divided as far out as possible (Fig. 11), and the ureter is then dissected free up to its entrance into the bladder (Fig. 12).

The same proceeding is then carried out on the opposite side.

The uterus is now pulled forwards, and the peritoneum covering the utero-sacral folds and the bottom of Douglas's pouch is divided, and the rectum separated from the vaginal wall by scissors and swab pressure. The uterus being then pulled backwards, the bladder is still further separated from the front of the vagina.

Angular clamp forceps are now applied to the utero-sacral ligaments and the lateral cervico-pelvic ligaments and sub-ureteric

tissue respectively on one side, and these structures are divided with scissors as far outwards as possible. The same proceeding is then carried out on the opposite side (Fig. 13).

The uterus, now only attached by the vagina, is pulled well up, and a clamp is applied across the vagina from $1\frac{1}{2}$ to 2 inches from its upper end. The instrument most convenient to this end is that designed by my colleague, Comyns Berkeley, and myself (p. 481).

Before the clamp is applied the gauze packing is withdrawn from the vagina, carrying with it any *débris* that has accumulated there.



FIG. 11.—Wertheim's operation. Ligature of the uterine artery. (From Berkeley and Bonney's "Textbook of Gynaecological Surgery." Cassell.)

The vagina is now cut across below the clamp, and the tumour is thus removed, encapsuled in the upper part of that canal (Fig. 14).

All bleeding points are now seized and ligatured, especially in the lateral angles of the upper end of the cut vagina, which contain the lateral vaginal vessels. The angular clamps holding the sub-ureteric tissues are then replaced by ligatures.

Hæmorrhage having been arrested, further extirpation of the pelvic cellular tissue is proceeded with, especially a sheet on either side containing at its upper edge the superior vesical artery, the removal of which exposes the obturator regions, from which all glands are then dissected out.

The external iliac vessels are then laid bare, and the chain of

glands lying between and on them is dissected off from below upwards as high as the bifurcation of the common iliac artery or the aorta, as may seem most expedient to the surgeon (Fig. 15).

Any suspicious glands or tissue over the internal iliac vessels having been removed and all oozing stopped, the cut edge of the peritoneum covering the bladder and anterior half of the pelvis is united by a continuous suture to that covering the rectum and the posterior half of the pelvis. A new peritoneal pelvic

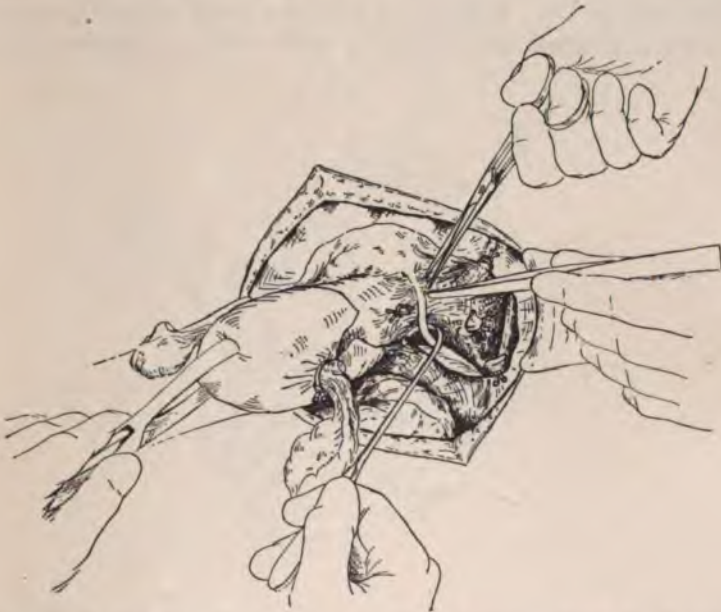


FIG. 12.—Wertheim's operation. Isolation of the ureter. (From Berkeley and Bonney's "Textbook of Gynecological Surgery." Cassell.)

floor is thus created, beneath which lies a cavity communicating with the open end of the divided vagina.

The abdominal wound is now closed in the usual way.

Difficulties, Dangers and Complications of the Operation.

—As will be gathered, the operation is a formidable one, but the difficulty varies immensely in different cases.

Obesity and Advanced Growth.—In obese and nulliparous patients with advanced disease the resources of the surgeon may be severely taxed; whilst, on the other hand, in thin women whose abdominal wall has been relaxed by repeated pregnancy, and in whom the growth is early, the proceeding may be unassociated with any difficulty greater than attaches to the performance of manipulations

carried out in a confined space and close to structures of vital importance.

The Bladder.—The separation of the bladder may be difficult owing to morbid adhesion to the diseased cervix, and it may tear in the process. In advanced cases it may be necessary to deliberately re-sect a portion of it or abandon the continuance of the operation.

Paralysis of this viscus always follows the operation for a week or two, and it is necessary to regularly catheterise the patient during this period. Functional activity always returns eventually.

Owing to the fact that the cavity under the new peritoneal pelvic

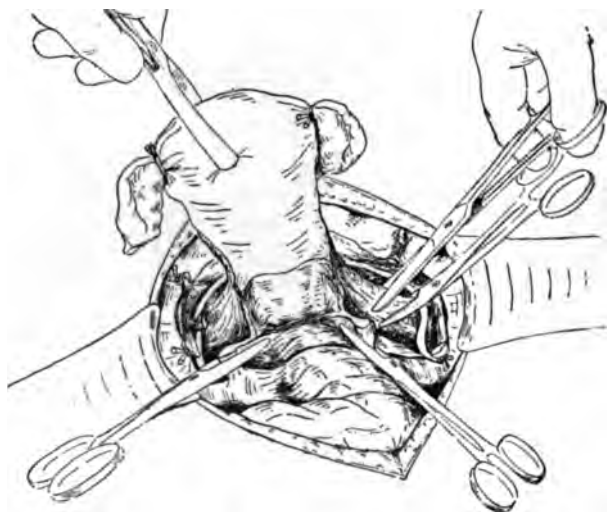


FIG. 13.—Wertheim's operation. Division of the para-vaginal tissue. (From Berkeley and Bonney's "Textbook of Gynæcological Surgery." Cassell.)

floor always becomes more or less infected, and that the bladder bounds this cavity in front, a degree of cystitis occurs very commonly during convalescence, though it is minimised by washing out the bladder with boric acid once a day until its power is restored.

A vesical fistula communicating with the vagina is very likely to form if the bladder has been opened during the operation. It may close spontaneously or require a plastic operation to cure it.

The Ureter.—The isolation of the ureter may be difficult if the parametric tissue is much infiltrated, and in extreme cases it may be necessary to resect part of it and implant the upper cut end into the bladder.

The isolated portion of the ureter may slough, causing a ureteric fistula communicating with the vagina. Such fistulæ may close spontaneously, or may subsequently necessitate vesico-ureteric implantation or nephrectomy to relieve the patient from the annoyance.

The Rectum.—The growth may be adherent to the rectum. Extensive involvement contra-indicates the operation, but small



FIG. 14.—Wertheim's operation. Division of the vagina by the cautery knife.
(From Berkeley and Bonney's "Textbook of Gynecological Surgery." Cassell.)

areas of adhesion may be excised. A recto-vaginal fistula may subsequently form. It nearly always closes spontaneously.

Hæmorrhage and Shock.—More or less free bleeding usually occurs during the operation. From experiments performed by Comyns Berkeley the average loss was shown to vary between 20 and 30 fluid ounces. Most of this is due to a persistent oozing, which it is impossible to arrest until the extirpation has been effected.

Occasionally it may be necessary to ligate the anterior trunk of the internal iliac artery on one side.

Most of the patients suffer more or less from shock, largely due to the loss of blood, but also due to the extent and duration of the operation. My colleague, Berkeley, and I take on an average from an hour to an hour and a quarter to perform this operation, but easy cases may be done within the hour, whilst difficult ones exceed an hour and a half. Speed in operating is of prime importance, and every effort must be made in this direction.

We have found that shock is lessened by pouring 3 pints of saline

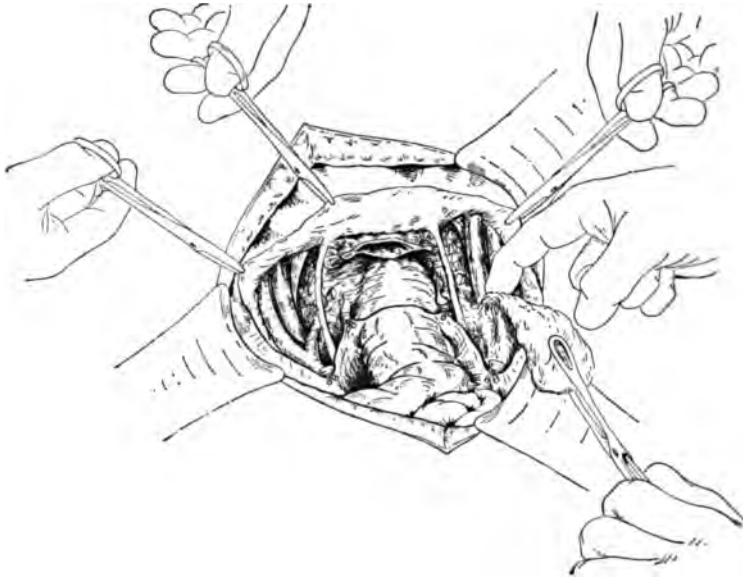


FIG. 15.—Wertheim's operation. Removal of the iliac glands. (From Berkeley and Bonney's "Textbook of Gynæcological Surgery." Cassell.)

solution into the peritoneum immediately before closing the abdominal incision.

Sepsis.—There is a marked tendency to suppuration of the abdominal wound. To prevent this as well as the possibility of cancer infection it is our custom at the Middlesex and Chelsea Hospitals to cover the wound edges with thin red sheet rubber, held in position by Berkeley's self-retaining retractor (p. 477). The frequency with which the cavity left in the pelvis becomes infected has been referred to. A purulent and often offensive discharge from the vagina commonly occurs during the second week of convalescence.

Immediate Results of the Operation.—The mortality of the

radical abdominal operation is necessarily high. Most of the patients who die after it do so within the first three days of shock. Comyns Berkeley, out of 243 cases performed by English operators and collected by him, found a mortality rate of 18 per cent.

Wertheim, who has performed the operation far more frequently than anyone else, has a death-rate of 15.2 per cent. Doderlein collected 715 cases with a death-rate of 14.8 per cent. General figures are, however, of no value in estimating the risk run by individual patients, for the mortality entirely depends upon the character of the cases dealt with. Berkeley, dividing the cases collected by him into three groups, obtained the following figures: in 186 advanced cases, mortality 23.1 per cent.; in nineteen moderate cases, mortality 5.2 per cent.; in thirty-three early cases, mortality 6.3 per cent.

It is thus shown that the high average death-rate is entirely due to the large number of advanced cases dealt with, and that in early cases capable of being alternatively treated by vaginal hysterectomy the primary mortality of the two operations is about the same.

Patients suffering from advanced carcinoma of the cervix are chiefly drawn from the lower classes, who from ignorance, indolence and want of means delay visiting the doctor till the last possible moment. These women, mostly elderly, and debilitated as the result of a lifetime of hard work, insanitary surroundings and insufficient food, are very bad subjects for a severe operation, quite apart from the cachexia due to the disease.

Percentage Operability.—In estimating the value of the operation it is necessary to consider not only the death-rate but the operability rate.

The mere statement that an operator has a certain death-rate is meaningless unless one knows the proportion of patients operated upon out of a hundred that presented themselves to him for treatment.

The percentage operability is greatly increased by the radical abdominal operation as compared with vaginal hysterectomy. For whilst by the latter not more than fifteen out of every 100 patients can be treated, by the latter from 50 to 70 per cent. can have a chance of cure given them. Wertheim has operated upon 49 per cent. of his cases, Bumm on 90 per cent. Doderlein and Kronig found the average percentage operability of ten operators was 68 per cent.

Ultimate Results of the Operation.—It is customary to set a period of five years' immunity from recurrence as the standard of complete cure.

Accepting this, Wertheim claims to have cured 62 per cent. of the patients he has operated on, Pollosson claims 60 per cent., Mackenrodt 45 per cent., and Bumm 30 per cent.

Here, again, the mere percentage rate of cures of an individual surgeon is deprived of most of its value unless considered with the operability rate. Thus, as one might expect, Bumm, whose percentage operability rate is 90, has the lowest percentage number of cures; whilst Wertheim, whose percentage operability is 49, has the highest percentage number of cures. When, however, one estimates the actual number cured out of 100 patients seen, the results of the two operators are very similar.

As the radical abdominal operation has only been practised in Great Britain for the last few years, no figures of value are yet available bearing on the ultimate results of the operation; but making allowance for the possibility of exaggeration in some Continental results, it is probable that at least twenty out of every 100 patients seen will be found to have been permanently cured by the operation.

There is, however, another aspect of the operation which should not be lost sight of, namely, the lengthening of life, quite apart from permanent cure, which may result from it. As has been shown by Leitch, the average duration of a case of carcinoma of the cervix from the earliest symptom to death is one year and nine months.

Berkeley and I found that on an average six months had elapsed between the onset of the symptoms and the date of the patients seeking advice, so that the average life-expectation of these women is one year and three months.

All patients, therefore, who survive two years after the operation have had their lives lengthened by its performance. When recurrence occurs it is unusual in the vaginal scar, but affects the pelvic and iliac cellular tissue and the lumbar and aortic glands.

The Limits of the Operation.—Extensive infiltration of the bladder is the most serious bar to the operation, for though it is possible to resect the affected part of the bladder wall, yet the likelihood of a fistula communicating with the vagina is great. Such a condition is distressing to the patient and very difficult to close. Moreover, in most of these advanced cases resection and implantation of at least one ureter will probably also be necessary, with the likelihood of a ureteric fistula as a sequela. The distress caused by such fistulae, added to the poor chance of freedom from recurrence and the necessarily increased severity of the operation, makes the performance inadvisable except in exceptional cases.

Extension of the growth to the anterior wall of the rectum, which never occurs until late, is likewise a contra-indication.

Infiltration of the broad or utero-sacral ligaments can be dealt with unless extreme, and induration in these regions is therefore no contra-indication, and the more so because such induration may be found to be due to the chronic salpingitis or cellulitis which so commonly is present in the more advanced cases.

Extension on to the vaginal wall can be successfully surmounted, as can secondary nodules there, provided that they are situated in the upper half of the canal. Should they be situated in the lower half, and the case is otherwise considered operable, the radical hysterovaginitomy by the vaginal route presently to be considered is indicated in preference to the abdominal operation.

Enlargement of the pelvic and iliac glands, even if cancerous, does not forbid the operation unless they are extensively adherent to the iliac vessels, and the more so because many of the enlarged glands are shown by the microscope to be purely inflammatory. Enlargement of the lumbar and aortic glands at once contra-indicates further progress with the operation.

Clinically, then, a case is to be considered as feasible for the operation if it appears that the bladder wall is free or practically free of the growth, and if the fixation of the uterus is not so complete but that it can be pushed upwards; the old test of the possibility of pulling it downwards only applies to the feasibility of vaginal hysterectomy.

In cases of doubt an examination under an anæsthetic should be undertaken to ascertain the points enumerated.

Even by this means, however, it is impossible in a certain proportion of cases to be sure as to the possibility or not of removal, and it is then proper to open the abdomen and explore the condition from above.

An attempt may be made to see if the bladder will strip off the cervix, and if it does so the operation may in most cases be proceeded with. If it will not do so owing to extensive cancerous adhesion, the *status quo ante* should be restored by sutures and the wound closed. These incompleated operations usually recover well.

RADICAL HYSTERO-VAGINECTOMY BY PARA-VAGINAL SECTION.

The last method of extirpation of carcinoma of the cervix which remains to be discussed is the operation devised by Schauta. It has for its object the removal of the entire vagina and uterus, together with the adnexa and as much of the parametric and paravaginal tissues as may be feasible.

Technique of the Operation.—The patient being placed in the lithotomy position, the lower inch of the vagina is dissected free and the orifice of the canal is then closed by sutures, the ends of which are left long to act as a tractor.

The entire length of the posterior vaginal wall is then separated from the rectum up to the reflection of the peritoneum at the bottom of Douglas's pouch. The para-vaginal incision is now made, extending along the left margin of the posterior aspect of the vaginal bed, and emerging on the skin at the junction of the posterior and left lateral portions of the incision that have been previously made to free the lower end of the vagina. From here it is carried backwards beyond the left margin of the anus towards the coccyx. The fibres of the left levator ani are divided.

This incision enormously increases the accessibility of the deeper parts of the pelvis, but is associated with a good deal of bleeding, which must be controlled before the operator proceeds further.

The vagina is now freed laterally, and is dissected off the base of the bladder until the uretero-vesical junction on either side is apparent. The ureters are then displaced laterally as much as possible by blunt dissection.

The anterior and posterior peritoneal pouches are now opened.

The base of the broad ligament on either side is then ligated as far out as possible, and the uterine artery being thus secured, the cervix is cut free of its lateral attachments.

The uterus and vagina being well pulled down, the upper part of the broad ligaments comes into view. These are best secured by anteflexing the fundus of the uterus through the hole in the bottom of the utero-vesical pouch in a manner similar to that often performed in vaginal hysterectomy. The round and ovarico-pelvic ligaments having been secured on either side and divided, the last remaining attachments of the mass to be removed are severed and the extirpation is complete.

The very large oozing surface is now dealt with, and all vessels not previously secured are ligated.

The para-vaginal incision is then closed by interrupted sutures, and the vaginal bed up to its entrance into the peritoneal cavity is packed with gauze.

Difficulties, Dangers and Complications of the Operation.—These are in the main similar to those of the radical abdominal operation. The oozing during the earlier stages is very troublesome. The bladder or rectum may be injured during the separation of the vagina, whilst the ureters run some risk in difficult cases.

On the whole, shock is less marked than in the abdominal

operation, but convalescence is prolonged on account of the suppuration of the operation area that almost certainly follows. The long gap left by the extirpation takes many weeks to fill up.

Results of the Operation and the Operability Rate.—Schauta's percentage mortality is 10·8 per cent. for 258 cases. In early cases the mortality was 3·7 per cent., and in advanced cases 20·7 per cent. His percentage operability rate was 48·7.

As regards permanent cure, he claims 39·5 per cent. of his patients operated upon as being alive five years afterwards.

The results, therefore, are very good in Schauta's hands, who has had far more experience of the method than any other operator.

Limits of the Operation.—The limits of the operation are somewhat more narrow than those of the radical abdominal method. Moderate induration of the para-cervical tissue does not bar it, whilst marked extension on to the vaginal wall so long as it does not involve the bladder base, can be dealt with.

The operation is especially suitable for cases complicated by secondary nodules in the lower half of the vaginal wall, for it is difficult to remove so much vagina by the abdominal route.

On the other hand, involvement of the iliac or obturator glands renders the operation useless, and the greatest drawback to its practise is that such involvement cannot be ascertained until the extirpation has been performed.

CONCLUSIONS AS TO OPERATIVE TREATMENT.

I am strongly of opinion that the modern radical abdominal operation is the method of election in the large bulk of cases of carcinoma of the cervix in which extirpation is feasible.

As compared with vaginal hysterectomy, it has the advantages of an enormously increased scope, a removal in accordance with the demands of the pathologist, and a greatly increased prospect of freedom from recurrence.

Its high initial mortality, though at first sight a drawback in comparison with the old operation, has been shown to be due to the much more advanced cases dealt with, and that if its results in early cases only are considered, it stands at no disadvantage in regard to immediate risks with the less efficient operation. On an average, out of 100 cases presenting themselves for treatment to a surgeon only practising vaginal hysterectomy, eighty-five succumb to the disease without operation, one dies as a result of the operation,

and of the fourteen survivors not more than two are alive five years afterwards.

Assuming an operability rate of 60 per cent., a mortality rate of 20 per cent., and a permanent cure rate of 80 per cent. for the radical abdominal operation, out of 100 patients presenting themselves forty will be abandoned to the disease, eight die of the operation, and of the fifty-two that survive fifteen at least are living five years afterwards.

In this comparison I have purposely assumed a permanent cure rate very much lower than the Continental statistics previously quoted; but even so, the immensely increased number of permanent cures effected by the modern as compared with the older operation is well brought out.

As compared with simple total abdominal hysterectomy the modern radical abdominal operation has much the same advantages as already enumerated in comparison with vaginal hysterectomy.

Radical hystero-vaginectomy by Schauta's method, previously described, comes into much closer competition with the procedure of Wertheim. In the hands of its originator it has a somewhat lower mortality rate, balanced, however, by a reduced operability rate.

Theoretically its greatest disadvantage is the impossibility of removing the regional glands. It has been argued that the removal of glands already malignant is useless; of those uninvaded, unnecessary. Whilst it cannot be denied that in those cases presenting at the operation carcinomatous pelvic and iliac glands the chances of permanent cure are not great, yet a fair number of women surviving after four years in whom the glands were carcinomatous at the time of operation are reported from the Continent.

Those who as a routine practise radical hystero-vaginectomy by para-vaginal section, necessarily leave gross masses of carcinoma behind in somewhere between 20 per cent. and 30 per cent. of their cases, for it is in this proportion that glandular involvement is found. Thus a number of these operations would have been better left undone.

To sum up, then, I am of opinion that the radical abdominal operation should be the method of choice in the majority of cases, whether the growth is early or advanced. In a few instances where the patient is very obese, or where secondary nodules are present in the lower half of the vagina, hystero-vaginectomy by para-vaginal section is indicated.

Simple vaginal or abdominal hysterectomy should be reserved

for those exceptional cases where, in spite of the growth being very early, the general condition of the patient is one of such feebleness that the more extensive operations would not be borne.

PALLIATIVE TREATMENT.

When a carcinoma of the cervix is deemed inoperable from the point of view of radical removal, the course to be pursued depends upon the individual circumstances of the case.

Thus in old women the disease may run a slow course. Leitch and Andreizen found that between the ages of sixty and sixty-nine the average duration reached its maximum (over two years), whilst in patients below forty it was but little over a year.

The degree of suffering entailed likewise varies very much. It is most marked in the rapidly growing tumours occurring in the comparatively young. Pain may be severe and continuous from an early date, or may only be present in any intensity shortly before the close.

Hæmorrhage is a very marked feature in some cases, and rapidly reduces the patient to a condition of extreme anæmia, whilst in others it is slight, and a plethoric appearance may be maintained for a long time.

Fætor of the discharge, a peculiarly distressing symptom to women of sensitive delicacy, also varies very much in its occurrence. In the fungating or deeply ulcerating types of the disease it is excessive, but in the diffuse infiltrating forms it may be absent altogether or only appear very late.

The treatment of cases of carcinoma of the cervix advanced beyond hope of cure may be divided into: (1) Methods having for their object the retardation of the growth, and (2) those intended to relieve particular symptoms.

Retardation of the Growth.—Radium.—An estimate of the exact value of the application of radium is not yet obtainable, the treatment being limited to those few individuals or institutions possessing a sufficient quantity of the element. From reports at present at hand there appears no doubt that its influence in reducing the size of the primary growth and relieving pain and fætor is in many instances remarkable. It is the first treatment to be advised in cases too advanced for operative measures. Radium does not appear to reach the deeper extensions of the growth, and therefore does not cure the disease.

Cauterisation.—The effect of the actual cautery in retarding the growth of the neoplasm is undoubted in certain cases. The greatest advocate of this method, Byrne, recorded some

apparent cures by its use, but these happy results have not been confirmed by subsequent workers. Byrne's procedure was very drastic, the cauterisation being pushed to its utmost limit. I have had experience of a number of cases treated with the cautery, and there can be no doubt that its effect is usually to lessen or stop all fœtor and discharge for a while, and that in some instances a partial healing by granulation occurs in the cauterised area, markedly retarding the growth. In other cases, however, especially those presenting a rapidly growing and fungating mass, the relief is very temporary. The operation, however, can be repeated, and inasmuch as it relieves the patient of the drain of continuous loss of blood and the toxic effects due to absorption from the stinking necrotic growth, it undoubtedly both prolongs life and renders it more agreeable.

The operation is thus performed. The patient being anæsthetised and placed in the lithotomy position, the vagina is thoroughly irrigated. The growth is then scraped away with a sharp scoop until firm tissue is reached. The cautery is then applied not merely superficially, but plunged into the substance of the tissue for some depth, the object being to secure the sloughing out of a considerable mass.

The excavation thus effected is packed with iodoform gauze for twenty-four hours, after which the vagina is frequently irrigated until all foul discharge has ceased. This occurs in about a week or ten days, when the sphacelated tissue separates. The frequency of the vaginal irrigation may then be diminished.

The risks of the operation are slight. Occasionally the utero-rectal peritoneal pouch is opened, but no ill results follow as a rule.

Acetone.—The use of acetone in inoperable cases has been lauded on the Continent. Acetone combines "tissue-fixing" properties with great penetrability. The growth having been scraped away until firm tissue is reached, acetone is poured into the excavation through a tubular speculum and left *in situ* for from fifteen to thirty minutes. The result is a cleansing of the diseased area, combined with a destruction of the more superficial layers of the wall of the cavity. The operation can be repeated.

I have used acetone in carcinoma of the cervix, but consider its effects inferior to those of the actual cautery.

Caustics.—Many caustics have been used in this disease, such as chloride of zinc, arsenious acid and nitric acid. Their effects are like those of the actual cautery, but they cause much more pain, are more troublesome to apply, and, in some at least, there is a risk of poisoning by absorption.

Fulguration.—The application to the growth of electric sparks of intensely high voltage has been practised by Keating Hart. The results of the method have been reported. No cures were obtained, but improvement, due to destruction of the more superficial layers of the neoplasm, was obtained in many cases. I have no experience of this treatment, which would appear to be the same in its effects, but much less easily applied than the actual cautery.

The Relief of Symptoms. — *Fætor.* — Frequent douching is desirable. Crude sanitas, one drachm to the pint, is the best deoderant in my experience. The external parts should be frequently washed, and a diaper should be worn and should be frequently changed. When incontinence of urine is present, pads of "wood-wool" appear to lessen the offensive odour.

Pain.—Aspirin should first be tried, later phenacetin or antipyrin; morphia should be reserved as long as possible. It is found in institutions that the resort to this drug can be much postponed by judicious management. Patients placed on it too early soon lose all self-control, and their pain sense becomes heightened in the intervals between the periods in which the narcotic is having effect.

Hæmorrhage.—These patients rarely die from the direct effects of the bleeding, though it may at times be very severe. It can usually be checked by hot douching (115° to 118°). As a last resort the vagina must be plugged with gauze.

VICTOR BONNEY.

REFERENCE.

- ¹ Berkeley, C., and Bonney, V., *Gynaecological Surgery*, Lond., 1911, p. 366.

CHORIO-CARCINOMA (CHORION EPITHELIOMA, "DECIDUOMA MALIGNUM").

THIS remarkable growth, the most interesting of all forms of malignant disease, is very rarely met with. It arises by the assumption of malignancy on the part of the cells of the foetal trophoblast, a structure temporarily developed in early embryonic life for the purpose of obtaining nutriment for the growing ovum.

The trophoblast reaches its highest development about the third month, after which it declines, but remains vestigial even at full term as the epithelium covering the chorionic villi.

If the periphery of an early ovum, say about a month old, is examined under the microscope, the trophoblast is seen to consist of a mass of cells of two kinds: (1) small cells with clear bodies and a reticulated nucleus, and (2) large masses of multi-nucleated protoplasm called syncytia. These cells are actively eroding and destroying the maternal tissues in which the ovum is embedded, and the general appearance is indistinguishable from that of a slide made from a case of chorio-carcinoma. In fact, the trophoblast in early embryonic life acts like a malignant growth, destroying the tissues on which it is parasitic. This infiltrative and destructive power is normally a temporary one, and ceases after the chorionic villi are perfectly formed, when nutrition by destruction gives place to that by transudatory interchange. Under exceptional circumstances and for reasons we do not understand, this power sometimes passes into actual malignancy.

Chorio-carcinoma may arise from any pregnancy, but it is most often associated with the previous formation of a vesicular mole.

The growth becomes obvious, usually within six months of the termination of the pregnancy that gave rise to it, but it may be synchronous with it.

It is probably the most malignant type of tumour known to the pathologist, and its rate of growth may be remarkable.

In appearance it has a characteristic deep blood colour, and indeed is largely made up of blood, the tumour cells lying in groups and masses scattered through its bulk, particularly towards its periphery.

For surgical treatment to have a chance of success, or even to be feasible, early recognition of the condition is imperative. Unfortunately on account of the rarity of the disease its true nature is

usually not suspected until it is well advanced. The leading feature is hæmorrhage from the uterus, with rapid enlargement of that organ. As in most cases the symptoms follow very shortly on a miscarriage or a labour, they are apt to be attributed to the retention in the uterus of a portion of the ovum or afterbirth, and time may be wasted in treating the patient with ergot and other styptic drugs. Even after exploration of the uterus the nature of the condition has been overlooked, the portions of tissue removed being considered to be fragments of placenta altered by retention. In such cases, of course, no relief is afforded by the operation, the hæmorrhage goes on, and after a time it becomes obvious that the uterus is continuing to enlarge.

When a vesicular mole has preceded the onset of the disease, the diagnosis is more likely to be established early, because of the known relationship between the two conditions.

Metastatic growths form with rapidity, both by vascular and lymphatic transmission. Thus the lungs are early affected. A frequent site of secondary nodules is the vaginal wall, and, further, a number of cases are on record in which such nodules were apparently primary, no growth being found within the uterus.

It therefore behoves practitioners to bear in mind the possibility of the disease, and to submit to microscopical examination all fragments removed from a recently delivered uterus that appear atypical.

The diagnosis being made, instant operative measures are indicated. These should take the form of the radical abdominal operation as employed for carcinoma of the cervix, and described under that heading (p. 601). The prognosis is very bad, but it is a remarkable fact that in spite of the usually intense malignancy exhibited by these tumours, proportionately more cases of spontaneous disappearance have been recorded of them than of any other species of malignant growth.

VICTOR BONNEY.

ENDOMETRITIS.

INFLAMMATION of the mucous membrane of the uterus may be acute or chronic. When acute, the whole extent of the mucosa, corporeal and cervical, is usually affected. In chronic inflammation the process may be limited to the lining membrane of the body of the uterus, when it is commonly designated corporeal endometritis, or the mucosa of the cervical canal alone may be affected, when it is termed cervical endometritis.

ACUTE ENDOMETRITIS.

The question of irrigation of the interior of the uterus, or of instrumentation of any kind in acute endometritis, is one about which opinions may differ. Shall we, feeling that any manipulation of the parts may open up fresh channels of infection, hold our hand, or shall we, by irrigation or curettage, endeavour to relieve the uterus of some of the infection? In cases due to bacterial infection, in which we suspect decomposing placenta or decidua to be present in the uterine cavity, there can be no question that the proper procedure is to empty the uterus by means of the finger, curette and irrigator, dilating the cervix if necessary to accomplish this purpose. This is the variety which is most frequently fatal, and though we know that in many of these cases the uterus itself may appear to be but little affected owing to the organisms having passed directly into the circulation, yet prompt interference by curettage may cut short the disease, may prevent the fatal issue, and also save the patient from serious changes in the tubes and peritoneum. When the inflammation is caused by the gonococcus, or by infection arising after operative procedures, irrigation carefully performed may be considered safe and beneficial.

Irrigation.—For the safe accomplishment of irrigation there are three essentials: First, the cervical canal must be sufficiently patulous to admit the irrigator; secondly, the position and the curve of the uterus, ascertained by the bi-manual examination, must be known before the passage of the irrigator is attempted; thirdly, the manipulation must be executed with the gentlest and most delicate touch. When the patient's condition permits of it, general anæsthesia should be employed. In acute endometritis, as a rule, no dilatation is required. The cervix is already soft and the

canal patulous, and provided the curve of the uterus is known, the instrument should slip in without hitch or hindrance. If any resistance is encountered no attempt should be made to forcibly overcome it. It is better to abandon the operation altogether than to push the point of the instrument into the wall of the soft uterus. If the patient is acutely ill, irrigation, provided it can be satisfactorily accomplished, should be carried out in bed. Lying on her back, the buttocks must be raised to enable the operator to carry the point of the instrument up to the fundus. Usually when placed upon a bed-bath the hips are sufficiently raised, but if not, a towel or sheet can be folded and placed underneath them to give the necessary height. The vagina is, in the first place, well douched with a warm antiseptic lotion; the surgeon inserts two fingers of the right hand into the vagina, and carries them up to the external os uteri. The irrigator is then slipped into the vagina and guided along the fingers of the right hand up to the cervix. With great gentleness the point of the instrument is introduced into the cervical canal



FIG. 1.—Flushing curette.

and passed upwards. If the fundus is to the front, the handle of the instrument is depressed; if retroverted, the handle is elevated. If the body of the uterus is to one or other side, the handle is carried in the opposite direction. While the instrument is being passed, the irrigating fluid, which should be at a temperature of 110° F., is running all the time to prevent the introduction of air.

When the patient can be removed without risk, she should be placed on a table in the lithotomy position. This has the advantage of giving the operator better access to the affected parts and greater freedom of manipulation. Should the operation be performed without anæsthesia, if the patient at any time complains of pain, the instrument must be at once withdrawn.

The water used in irrigation may contain carbolic acid 1 in 100, lysol 1 in 100, tincture of iodine 3j [U.S.P. m20] in two quarts of water, or corrosive sublimate 1 in 4000.

Curettage in Acute Endometritis.—The use of the curette in acute endometritis is limited to the removal of the infected products of conception. The best instrument for the purpose is the blunt flushing curette (Fig. 1). When the cervical canal is wide enough, the forefinger, well sterilised, should be introduced into the uterine cavity, and the whole of the interior palpated by it. This can be

effectively done with the aid of the extra hand acting from the abdominal surface and affording a point of resistance. In this manner all pieces of placental tissue will be detected. These can be removed either with the finger or with the curette. After one is sure that all the fragments have been removed, the uterus is washed out with sublimate lotion (1 in 4,000), followed by several quarts of hot saline solution. The interior is then swabbed out with pure carbolic acid or iodised phenol and the vagina packed with iodoform gauze. This gauze should be removed daily, and a sublimate douche given at each dressing. Absolute rest, light diet, and attention to the bowels should be enjoined. Pain will demand morphia and the free use of hot applications to the abdomen and perineum. Quinine is most useful, not only to combat the pyæxia, but to stimulate the uterus to contract.

CHRONIC CORPOREAL ENDOMETRITIS.

The treatment of chronic corporeal endometritis is most successfully accomplished by dilatation of the cervix, removal of the infected endometrium by curettage, and later, if necessary, by the application to the uterine cavity of strong antiseptics. The therapeutic object of curettage is to replace the diseased endometrium by a new healthy membrane under aseptic conditions.

Curettage.—The operation of curettage is best performed with the patient in the lithotomy position, the legs being supported by assistants, or held up by some suspensory apparatus, such as Clover's crutch. The pubes and vulva having been shaved, they and the buttocks are well scrubbed with lysol lotion (1 in 100). If the vagina has not previously been prepared, it is also thoroughly scrubbed out with pledgets of cotton-wool soaked in lysol lotion, or, instead of lysol, tincture of iodine may be used. Any fluid left in the vagina is removed with a dry swab. The patient being anæsthetised, the operator should, before proceeding further, make a careful bi-manual examination to determine the position of the uterus, the curve of the uterus, the condition of the uterine appendages, and of the utero-sacral ligaments. The frequent association of salpingitis and pyosalpinx with endometritis makes this investigation of the first importance. While curettage is not contra-indicated in cases of chronic salpingitis, it is essential that the operator should know of the existence of these affections, in order that he may conduct the operation with the greatest care.

A speculum is now passed to retract the posterior vaginal wall, in order that the vaginal portion of the cervix and the anterior vaginal

wall may be exposed. The speculum should be self-retaining, and one of the best is Auvar's. This instrument is weighted, and has a slot down the centre of the handle for lotion to escape. It is most suitable in women with wide vaginae. In the virgin the small blade of Sims's speculum will be found suitable, though in these cases it is, when possible, advisable to operate without a speculum,



FIG. 2.—Graduated metal dilator.

in order that the hymen may be spared any injury. The vaginal portion of the cervix being exposed, a volsellum is fixed in the anterior lip, and another in the posterior, and gentle traction is made until

the external os is at the vulvar orifice. This can be done if the uterine ligaments and appendages are healthy. When the cervix is at the vulva, the bend of the uterus is undone and its long axis straightened out, thus rendering the accomplishment of the operation a matter of no difficulty. It is very different, however, when the uterus is fixed in the pelvis by inflammatory thickening of the ligaments. Then the organ cannot be pulled out, nor can



FIG. 3.—Author's modification of Sims's dilator.

the flexion be undone. Under such conditions the passage of the instruments into the uterus may be difficult.

If the cervical canal is sufficiently wide to allow the curette to pass in easily, no dilatation is required. If such is not the case, the cervix must be sufficiently dilated, not only to admit the curette, but also to allow of the removal of the uterine scrapings.

Dilatation is effected either by graduated metal dilators or by steel-branched dilators. The former are obtained in sets gradually increasing in diameter, and provided with blunt extremities (Fig. 2). The cervix, being steadied by volsella, the uterine sound is passed to determine the direction of the cavity, then a dilator, which passes easily, is introduced, followed successively by larger ones, until the canal is sufficiently patulous to allow the curette to enter easily. They have the advantage of dilating the cervix without tearing it.

Of steel-branched dilators of the glove-stretcher type one of the best is Sims's or the author's modification of Sims's. It has three prongs and dilates equably, and is of special service when wide dilatation is necessary, and requires to be rapidly accomplished (Fig. 3).

The object of curettage in most cases is to remove the entire endometrium. This is accomplished by using two or more curettes, the distal ends of which are shaped differently, and in operating on



FIG. 4.—Roux's curette.

the whole of the interior in a regular and systematic manner. One is aware that this has been successfully undertaken when a grating sound is elicited by the instrument over the whole interior, signifying that the muscle has been entirely bared of its mucosa.

The operator, with his left hand, holds the volsellum placed in the posterior lip of the cervix, while his assistant makes traction on the anterior lip upwards towards the pubes. The curette is firmly held between the thumb and forefinger of the operator's right hand, and is passed through the dilated cervix up to the fundus. This upward movement is done slowly and carefully, to avoid the risk of perforating the uterus. Except in the uterus softened

by pregnancy, there is no danger of perforation in the downward stroke, which is made by bringing the in-

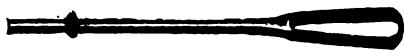


FIG. 5.—Loop curette.

strument firmly down from the fundus to the internal os. Commence at a definite position, say the middle of the anterior wall, and continue the operation round the whole of the interior, removing the endometrium in parallel strips, from fundus to cervix. This is repeated until the whole of the endometrium has been removed, which the operator knows is achieved when the muscle is reached and the instrument communicates to the hand a grating sensation. The scrapings, as soon as removed, should be placed in a small bottle containing 10 per cent. of formalin, and labelled with the patient's name and date of the operation.

To ensure thoroughness it is advisable to use two or more curettes of different shapes. *Roux's Curette* (Fig. 4), commonly called Martin's, from being the instrument used by Martin, of Berlin,

consists of a shaft with an elongated, hollowed-out portion at each end, one being larger than the other. The ends should be rounded. The instrument removes the endometrium in strips, but as one cannot be certain that the whole of that structure is removed by it, it is well to use, in addition, a loop curette (Fig. 5), the loop of which is broad, with one of the edges sharp and the other blunt. With these instruments curettage of the anterior and posterior walls can be thoroughly accomplished, but they may leave a narrow strip of endometrium under the fundus and on the lateral borders, and for the purpose of removing the strip a curette with a narrow loop (Fig. 6), furnished with a sharp edge, will be found most efficient. Scrape firmly, from left to right, underneath the fundus, and then down each side, where the anterior and posterior walls meet, paying particular attention to the orifices of the Fallopian tubes.



FIG. 6.—Narrow loop curette.

The curettage being completed, it is now necessary to remove detached fragments of mucosa which may be left in the interior of the uterus, either by washing out the cavity with sterile water by means of a two-way irrigator, or by swabbing it out with small pieces of sterilised wool on the end of a pair of uterine forceps



FIG. 7.—Uterine forceps with pledget of wool.

(Fig. 7). After this has been done dip a small pledget of wool in pure carbolic acid or iodised phenol, and apply it to the whole of the interior of the uterus. These agents are styptic as well as antiseptic, and stop any bleeding which may be present. As a rule, however, the bleeding after curettage is very slight. In gonococcal cases the application of a strong antiseptic to the interior of the uterus after the operation is specially called for, because the infection may lurk in the distal ends of the utricular glands which are not removed by the curette. The vagina is now douched with lysol lotion, then it is dried with a sterile swab and packed with iodoform gauze.

After curetting some operators pack the uterine cavity with sterile or iodoform gauze, their object being to favour drainage.

The gauze drain may be useful after curettage performed for acute septic endometritis, but is quite unnecessary in cases of the chronic affection, as in them there is little to drain, and any discharge can quite easily escape through the patulous cervical canal. When the uterus is tightly packed with gauze severe pain is frequently complained of, and there may also be elevation of temperature. The only instances in which uterine packing is indicated are when hæmorrhage is feared, and when the uterus has been perforated by the curette.

The *after-treatment* of curettage is very simple. The vaginal pack is removed the day following the operation, and an anti-septic vaginal douche is given twice daily for a week or ten days. The length of time a patient remains in bed varies. She must be kept in bed for a week at the shortest, but in post-abortion cases and when the uterus is subinvolved she should remain two weeks or longer.

The chief danger of curettage is perforation of the uterus. There are few men of experience who have not met with this accident. It is particularly apt to take place in the puerperal uterus, where the walls are soft and thin. The operator suddenly finds that the instrument passes in up to the hilt, and on placing his hand above the pubes he feels the end of the curette under the abdominal wall. It is possible that in some cases no perforation has taken place, the accident being simulated by the uterine wall suddenly becoming relaxed and yielding before the point of the instrument. When the accident does happen in an aseptic case, the line of treatment to be followed is to cease curetting and pack the uterus with iodoform gauze and allow the opening to close spontaneously, and the patient's recovery may be confidently expected without any untoward symptoms. If the case is known to be septic, or if any of the abdominal viscera have been injured, the peritoneal cavity should be opened immediately, the rent sutured with catgut, any visceral injuries that may be present repaired, the pelvis irrigated with saline solution, and a gauze drain inserted and carried through an opening made in the posterior vaginal fornix.

To prevent the occurrence of perforation the operator must exercise the greatest gentleness in handling the curette; the upward stroke must never be forcibly made, the cervical canal should be widely dilated, and the curve of the uterus should be ascertained beforehand by the passage of the uterine sound.

In the treatment of chronic corporeal endometritis one curetting generally brings about a satisfactory result. A new endometrium developed from the remains of the utricular glands grows quickly,

and becomes so well formed that pregnancy may occur five weeks after the operation. The character of the first succeeding periods after the operation is uncertain. They may be normal, or profuse, or absent. Generally the bleeding is much less than before the operation.

As a rule, the operation does not require to be repeated; an exception to this rule is found in the variety known as *exfoliative endometritis*. In this affection it may be necessary to repeat the operation several times.

When leucorrhœa persists after curettage, as it may do, especially in gonococcal cases, one must take steps to ascertain that the discharge comes from the cavity of the uterus and not from the cervix. If corporeal in origin, the further local treatment necessary consists of the application to the interior of iodised phenol, tincture of iodine, or carbolic acid. These agents are applied by means of a thin layer of cotton-wool wrapped round Playfair's probe, or a uterine sound. The patient is put in the semi-prone position, Sims's speculum is passed, the vaginal portion of the cervix is exposed, the anterior lip of the cervix is seized and steadied with a volsellum, and the dressed sound or probe, dipped in one of the before-mentioned medicaments, is passed carefully into the uterus and applied gently to the whole of the interior. It is a good plan before introducing the saturated probe to pass one or two dressed with sterile wool only to clear away mucus from the cervical canal. After the application the vagina should be well douched with sublimate solution (1 in 4,000), or with iodine solution (5j [U.S.P. ʒ20] of the tincture to 1 quart of water); then the vagina is dried with a sterile swab, and a tampon introduced soaked in glycerine with iodoform dusted over it, or in ichthyol and glycerine (5 per cent.), or in boro-glyceride and glycerine (5ij to ʒviij). The tampon is removed after twenty-four hours, and hot vaginal douches of iodine or sublimate given twice or thrice daily. If sublimate is used, one must, to prevent symptoms of mercurial poisoning, remove with a swab any of the solution left behind. In obstinate cases the above or similar local treatment will require to be carried on for one or two months, making the local application once or twice weekly.

CERVICAL ENDOMETRITIS.

The causes of cervical endometritis are gonococcal, puerperal and tuberculous infection. Gonorrhœa is the most frequent cause, and offers the greatest resistance to treatment. It is evidenced by an intractable discharge, in character thick, gelatinous and ropy, sometimes puriform, always tenacious. Chronic endocervicitis is

much more common than chronic inflammation of the lining membrane of the body, and the latter is frequently mistaken for the former. It is also more difficult to cure. When the glands of the cervix have become deeply infected, nothing short of amputation may affect a cure, while corporeal endometritis is, as a rule, satisfactorily treated by removing the mucosa with a curette. Cervical endometritis is one of the most obstinate of all gynecological affections, and if mild measures of treatment are adopted the patient, before she can be said to be cured, will be under the practitioner's care for a prolonged period. What may be termed mild treatment consists of douching and of making applications. Vaginal douches of warm water do little more than wash out the discharge which is lying in the vagina. Douches containing corrosive sublimate (1 in 4,000), or tincture of iodine (3j [U.S.P. m20] to the pint), are useful, and are most effective when used after the tenacious discharge has been removed by swabs and the inflamed mucosa has had applications made to it.

In making applications the cervix must be exposed by a speculum and the vagina protected by a pack of gauze or sterile cotton-wool. Various chemical agents may be used, and they are all applied by means of cotton-wool wrapped round Playfair's probe or a uterine sound, or held on the end of a pair of uterine forceps (Fig. 7). To avoid infecting the uterine cavity, be careful not to pass the instrument beyond the internal os. Previous to the application the parts should be cleared of discharge. Pure carbolic acid is not only antiseptic but it has also a styptic and stimulating action and leaves behind it a superficial slough. Prolonged perseverance with it in mild cases may ultimately produce a healthy surface. Iodized phenol (1 part of iodine in 4 of carbolic acid) makes an excellent application, and is specially beneficial in gonococcal cases. Argyrol (20 per cent.) has a like reputation. In slight cases these agents may be used three times in a week. Nitrate of silver (20 per cent.) may be applied once in ten days. After each application a copious antiseptic douche should be given. The vagina should then be dried and a tampon soaked in boro-glyceride and glycerine (3ij to 3viii) left in the vagina. This pack is removed on the following day, and antiseptic douches are given twice daily till it is time to repeat the application.

In severe cases, when the orifices of the cervical glands are closed and the secretion accumulates in them, forming Nabothian follicles which project as small cysts both on the vaginal and canal surfaces, these cysts should be punctured and the whole surface thoroughly scraped with a sharp curette. After this is done any of

the before-mentioned agents may be applied. This curettage may be repeated in the course of ten days or a fortnight. In bad cases Dr. Guy L. Hanner has found the use of the actual cautery an effective



FIG. 8.—Schroeder's operation.

method. The cervix is exposed by a speculum, and the surrounding parts being well protected, the cervix is fixed with a volsellum, and the cautery, heated to a bright red, is passed well into the cervical canal and two or three deep *lineæ cauteris* are made. This is repeated about once a fortnight.

In all the above-mentioned methods a considerable length of time is required before a successful result can be obtained, and even then there is no certainty that the affection will not recur. The treatment which gives the best result in all cases, and the only one which is applicable to extremely obstinate cases, is removal of the diseased endometrium. This may be practised by either of two operations, viz., Schroeder's method of re-section of the mucosa, or amputation of the vaginal portion of the cervix. The latter method is one which should always be performed in women over 35 years of age, for the important reason that in them carcinoma is apt to supervene.

Schroeder's Operation.—In this operation the inflamed mucous membrane is removed. The patient is placed in the lithotomy position, the cervix is exposed with a speculum, and with a volsellum drawn down to the vaginal orifice. It is then divided laterally as high as the fornix, so as to make an anterior and a posterior lip. A transverse incision is made across the base of the anterior lip, and all the mucosa from that point down to the healthy mucous membrane on the vaginal aspect of the cervix is cut away. The flap is then turned upwards and stitched to the healthy cervical mucosa by several catgut sutures. The posterior lip is treated in a similar manner. Excellent results as to the cure of catarrh, and also as regards the subsequent condition of the cervix after labour, have been recorded (Fig. 8).

Amputation of the Vaginal Portion of the Cervix.—As already stated that is the operation to be performed in women over thirty-five; it is also indicated in all cases where there is much hypertrophy and cystic degeneration. The operation will be described under Hypertrophy of the Cervix, p. 700.

Importance of General Treatment.—Special attention must be given to the general health, otherwise local treatment will be disappointing. Change of air and scene are helpful; rest from sexual activity is necessary. In severe cases, where the patient is much debilitated, complete rest in bed is called for. Patients who are convalescent should make a daily practice of resting in the recumbent posture for two hours with corsets and waistbands unfastened. In nearly all cases the administration of iron, quinine and strychnine is indicated. Iron should be stopped during the periods and ergotin substituted. If the discharge is gonococcal in origin, attention should be paid to the husband, and intercourse forbidden until both husband and wife are cured.

Treatment of Chronic Corporeal and Cervical Endometritis by Vaccines.—The use of vaccines in intractable cases of chronic

corporeal and cervical endometritis is a method of treatment which is worthy of trial, especially in gonococcal cases. A cure may be effected by gonococcus vaccine when other methods have failed. Doses of 100 million organisms, gradually increased to 500 millions, may be injected twice a week. (*See Vaccine Therapy*, vol. III.)

N. T. BREWIS.

EROSION OR ADENOMATOUS DISEASE OF THE CERVIX.

EROSION is an extension or growth outwards of the columnar epithelium lining the cervical canal to the vaginal aspect of the cervix. It occurs as a bright velvety patch, displacing the squamous epithelium, with which, in appearance, it presents a marked contrast.

It is met with in virgins, in nulliparous and in parous women. In parous patients "erosion" may be complicated by laceration of the cervix, or by laceration and hypertrophy.

In virgins the general health is frequently at fault, and special attention must be given to it. As it is desirable that in this class of patient there should be as little local interference as possible, the best treatment consists in giving an anæsthetic and excising the adenomatous patch. (*See Cervical Endometritis*, p. 627.)

In married women treatment depends upon whether the case is mild or severe and whether it is complicated by laceration or hypertrophy.

In mild cases pass Sims's speculum and expose the cervix. Wipe away with cotton-wool soaked in lysol solution (1 in 100) any discharge adhering to the surface of the erosion; seize the anterior lip of the cervix with a volsellum and pull it down, then with a sharp curette scrape the whole of the eroded area, and subsequently apply to it either iodised phenol or pure carbolic acid, then firmly pack the upper part of the vagina with iodoform gauze, or leave in the vagina a tampon soaked in boro-glyceride or alum and glycerine.

The pack or tampon may be removed in twenty-four hours, after which the patient is to douche twice daily with warm water, containing 1 drachm of sulphate of zinc, and 1 drachm of alum to a pint of water, or, instead of the astringents, 1 drachm [U.S.P. η 20] of tincture of iodine to a pint of warm water may be used. The scrapings and applications may be continued twice weekly, while in the meanwhile tonic treatment is administered. The healing process will show itself before long by the appearance of a white ring of healing at the edge of the erosion, and by small white patches of healthy tissue on the surface.

In severe cases excision of the erosion is best, not only because it is the quickest way of accomplishing the end, but also because by

Erosion or Adenomatous Disease of the Cervix. 633

removing the affected area we prevent the possible subsequent development of malignant disease.

If the affection is complicated by laceration of the cervix, first excise the adenomatous portion and then perform trachelorrhaphy. Should much hypertrophy co-exist with a lacerated eroded cervix, the treatment called for is amputation. (*See Amputation of the Vaginal Portion of the Cervix, p. 700.*)

N. T. BREWIS.

FIBROIDS.

PRELIMINARY CONSIDERATIONS.

PATIENTS afflicted with uterine fibroids in most cases seek advice for the associated menorrhagia. More rarely the disease demands treatment because of some complication which has taken place, such as septic infection, red degeneration, carcinoma of the endometrium, and cystic or sarcomatous degeneration. Again, the tumour may first cause trouble during pregnancy, labour, or the puerperium; or the patient's life may be endangered from the injurious pressure the fibroid is exerting. The treatment of fibroids will be considered under the headings of Drug Treatment, and Removal.

Drug Treatment.—Drug treatment can only be of use in those cases in which the symptom complained of is hæmorrhage, and this hæmorrhage must not be due to any complication occurring to the tumour, neither must it be associated with a fibroid polypus. With these exceptions, if the bleeding is only slight, it can, in a large number of women, be controlled by ergot. Ergot acts by causing the muscle in the uterus and blood-vessels to contract. It may be given in a mixture or in a pill. As a mixture it is best combined with strychnine, and may be prescribed as follows: Ext. Ergot. Liq., ʒss ad ʒj; Liq. Strychninæ m4; Acid. Hydrochlor. Dil., m10; Aq. Chloroformi, ad ʒj [U.S.P. R. Fluidextracti Ergotæ, ʒss ad ʒj; Strychnin. Hydrochlor, gr. $\frac{1}{24}$; Acid. Hydrochlor. Dil., m10; Aq. Chloroformi, ʒss; Aquam, ad ʒj], three times a day. It may be taken more conveniently as ergot, 3 grains in a pill three times a day. This drug may be given for long periods without apparently causing any harm to the patient, although it has been pointed out that the continued rise of blood pressure, due to contraction of the arteries, if persisted in too long, may damage the cardiac muscle. If ergot fails to control the bleeding, it is probable that no other drug will be successful, and although in such cases hydrastis, hamamelis, styptol, and stypticin can all be tried, relief following their use is so rare that I think it must be fortuitous.

Ergot, as already stated, will only efficiently control the bleeding when it is slight. This drug will often reduce the quantity of blood lost when the bleeding is severe; but its exhibition in such cases is not indicated, since, although the quantity lost may be less than

before it was taken, yet the total amount will be more than normal, and this spread over a series of months and years renders the patient a chronic invalid. This matter is again referred to under Removal of the Tumour. The exceptions to the rule that it is bad practice to continue the administration of ergot if it does not cure the bleeding are two. A more extended trial may be given to ergot, if the patient is young and anxious to have a child before the tumour and very likely the uterus is removed; and again, if the patient is more elderly and just approaching the age at which the menopause should supervene. It must, however, be remembered that fibroids are apt to cause sterility, and that whilst the menopause may be delayed for some years in women afflicted with these tumours, its advent does not by any means in all cases arrest the bleeding. In fact, owing to the contraction and shrinking of the uterus, the blood-supply to the tumour is diminished, resulting sometimes in necrosis and infection, and so continued hæmorrhage.

Removal of the Tumour.—The exact method by which the tumour is to be removed will depend upon its position in the uterus. It may be that to remove the tumour the uterus will have to be sacrificed. On the other hand, it may be possible to remove the tumour and save the uterus, and obviously the latter result should always be aimed at when the danger is not thereby increased. The following operations may therefore be necessary: Abdominal hysterectomy, vaginal hysterectomy, abdominal myomectomy, abdominal enucleation, vaginal myomectomy, vaginal enucleation.

Until Baer published his method of performing sub-total hysterectomy, the treatment of uterine fibroids was most unsatisfactory. Apart from the enucleation of small sub-mucous tumours or the removal of polypi, the practice was to interfere surgically only if the patient's life was directly threatened, in which case either the ovaries were ablated or the uterus was removed at the level of the cervix or completely extirpated. If the patient was in danger from bleeding, the ovaries were excised, on the assumption that an artificial menopause would ensue and the tumour consequently atrophy, as sometimes happens at the true menopause. This operation had nothing to recommend it, for in the first place it was a most unsurgical procedure, since it removed healthy organs and left a diseased one; secondly, it not infrequently happened that the operator failed to remove the ovaries, because, owing to associated inflammatory changes or displacement caused by the tumour, he could not find them; thirdly, small pieces of ovary were sometimes left, with the result that the bleeding still continued; and fourthly, the induced menopause instead of curing the patient often

made her worse. The operation of oöphorectomy, therefore, as a means of treating fibroids has rightly passed into oblivion.

Those surgeons who removed the uterus before the patient's life was imperilled, or who had to remove it because of some urgent necessity, met with much discouragement, the mortality being high. This was due to the fact that the principles of antisepsis and asepsis were not rightly appreciated, and a satisfactory method of hysterectomy had not been elucidated.

The operation of removing the tumour by strangling the cervix and broad ligaments with a wire noose, cutting away the uterus above the noose and stitching the stump into the abdominal wound, although the safest when Koeberle devised it, yet was most unsatisfactory, inasmuch as if the patient escaped death from hæmorrhage, due to the wire slipping, peritonitis or intestinal obstruction from inclusion of a loop of gut within the noose, the tissues left in the grip of the wire had to slough away, necessitating a prolonged convalescence of a septic nature. In an endeavour to surmount these dangers and drawbacks, several operators practised total extirpation of the uterus, and doubtless their success would have been greater had their aseptic technique been more perfect. In 1882 Baer devised a method of performing sub-total hysterectomy, comparable to that practised at the present day, namely, amputation of the uterus above the cervix after separate ligation of the ovarian and uterine arteries. By this procedure he was, on the one hand, able to minimise the danger of hæmorrhage, and on the other to lessen very considerably the liability to sepsis by dropping the pedicle back into the peritoneal cavity and closing the abdomen.

So striking an improvement in the technique of the operation did not, however, find such favour with gynæcologists as it undoubtedly merited. This was partly due, no doubt, to the fact that peritonitis so frequently followed abdominal operations, but certainly more to the opinion generally held that fibroids as a rule were of an innocent nature and could be efficiently treated with rest, good feeding, and drugs.

During the last fifteen years, and especially during the last ten, a remarkable change of opinion has taken place in regard to the surgical treatment of fibroids, for not only is it now realised that with adequate precautions the danger of sepsis is remote, but also an intelligent study of the life-history of these tumours has shown that they are very much more dangerous than was formerly supposed, and apart from subjecting a woman to years of invalidism, are not rarely the direct means of terminating her existence. No one has done so much towards establishing these facts as John

Bland-Sutton, who with unequalled experience, untiring efforts, and great courage has insisted on the surgical treatment of these tumours in face of much opposition and adverse criticism. But, after all, this has been the common lot of all reformers, and that which yesterday was regarded by many as quite unjustifiable is to-day looked upon as a matter of course, and practised by its erstwhile detractors with all the unbounded enthusiasm of religious converts.

The operation of hysterectomy for fibroids is now a very safe one. During the last fifteen and a half years at the Middlesex Hospital and the Chelsea Hospital for Women, sub-total hysterectomy has been performed for uncomplicated fibroids by eleven different operators in 873 cases with a mortality of 5·3 per cent., and for fibroids complicated by some other disease in 360 cases with a mortality of 4·1 per cent., or a total of 1,233 cases with a mortality of 5 per cent. At the Chelsea Hospital during the last five years sub-total hysterectomy has been performed for uncomplicated fibroids by nine operators in 197 cases with a mortality of 1·5 per cent., and for fibroids complicated by some other disease in 186 cases with a mortality of 1·6 per cent., or a total of 383 cases with a mortality of 1·5 per cent., whilst Bland-Sutton published a list of 101 consecutive cases of abdominal hysterectomy without a death.

This advance in the surgical treatment of fibroids has also been the means of saving countless lives in other ways, for it has established two important facts. In the first place the supposed fibroid, when the abdomen is opened, may prove to be some other disease, the removal of which cures the patient, whereas a few years ago, when operative interference was looked at askance, the mistaken diagnosis would have gone undetected with a disastrous result; and secondly, the bleeding associated in later life with these tumours is due to the supervention of carcinoma in 10 per cent. of the cases.

Indications for Hysterectomy.—Unless some operation less serious will suffice, hysterectomy as a treatment for fibroids is indicated when they cause serious bleeding, pain or pressure, rapidly increase in size or are the seat of some degeneration.

Bleeding.—The most constant symptom associated with fibroids which demands hysterectomy is bleeding, as already stated. In some cases the bleeding is not of serious import and can be efficiently controlled with ergot. There remain, however, a large number of cases in which the bleeding is more serious than this. In certain of these the hæmorrhage, on account of its severity, is a direct menace to life, and hysterectomy is imperative. In the remainder, though the bleeding does not directly threaten the existence of the patient, it subjects her to a condition of chronic

invalidism, each month of her life being divided into two cycles, one in which she is bleeding, and the other in which her medical attendant is endeavouring by drugs and rest to patch her up for the next hæmorrhage; and so things progress in a vicious circle until death, perhaps the menopause, or some enterprising surgeon relieves her of her misery.

It is the treatment of this class of case which of late years has caused such discussion. I am strongly of opinion that it demands hysterectomy; indeed, if the patient is poor and has to earn her own living there is no alternative to such treatment but the work-house, or eking out a precarious existence on the charity of others. But whatever the social position of the patient, hysterectomy is indicated, since no woman should be encouraged to spend as an invalid the best years of her life when she can be restored to health by an operation which in skilled hands has a mortality of under 2 per cent. when performed on patients whose health has not been allowed to dangerously deteriorate by prolonged bleeding or toxic absorption. A serious responsibility rests upon those who persuade a woman suffering seriously from bleeding fibroids to forego operative treatment on the chance that the menopause will bring relief, or because of the risk that the removal of the uterus will subject her to the risk of insanity, of alteration in her nature and sexual feelings, or unfaithfulness on the part of her husband. On the contrary, the menopause often increases the danger, and the supposed after-effects of hysterectomy are chimerical and just as likely to occur after operation in a woman with a healthy uterus as in one who has had the organ removed for a fibroid. In fact, nowadays large numbers of women suffering from bleeding fibroids seek more efficient and scientific treatment, refusing to tolerate such useless remedies as drugs, good feeding and rest, and rightly demand to be made useful members of society through the means of hysterectomy. Those, too, who have in the past refused to recognise repeated hæmorrhages not directly threatening life as an indication for hysterectomy seem oblivious of the fact that this increased bleeding is often due to sepsis, red degeneration, or carcinoma. It is not always, however, only the amount of bleeding that is important, but also the time of its incidence, and a delayed menopause when associated with fibroids should be regarded with the gravest suspicion, since statistics show that 10 per cent. of the fibroids removed by hysterectomy after the age of fifty are complicated with carcinoma of the uterine body.

Pain.—Fibroids of the uterus are painless unless they become

inflamed, cystic, the seat of red degeneration, or malignant disease.

Pressure Symptoms.—Retention of urine, intestinal obstruction, thrombosis of the femoral veins, and renal disease may all be due to the pressure of fibroids, and are direct indications for surgical interference. With many of these complications bleeding has not been a marked or troublesome symptom, and operative interference has been postponed until the pressure became acute, that is, until the danger of the operation is very greatly enhanced.

Fibroids which from their environment or size are likely to cause eventually dangerous pressure should be carefully watched, and if increasing in size they should be removed.

Should the Ovaries be Removed?—The observations of Crewdson Thomas showed that in patients over forty years of age any ovaries left after hysterectomy were of small value to the woman. Before this age their removal caused no particular symptoms, or was followed by an acute menopause.

Whilst the removal of healthy ovaries, as a rule, lessens the sexual instinct, and may even be a cause of dyspareunia from atrophy of the vagina from kraurosis, which at times follows in its train, the reverse may obtain if the ovaries are diseased or painful.

Experience shows that the danger of insanity or mental instability after the removal of the ovaries has been grossly exaggerated, and its use in the past as a bugbear to dissuade patients from operative treatment was more than reprehensible, such advice being at times indirectly the cause of death, or of much suffering from the fact that the patient gladly postponed the operation until by the urgency of her symptoms she was compelled to undergo it, by which time its severity and risk had been greatly enhanced.

It is true that removal of the ovaries may be the last factor in destroying the balance of a mind which is already unstable, but such a result is not peculiar to this operation; it may follow any operative procedure. After the menopause the ovaries can be removed if hysterectomy is thereby facilitated.

Before the menopause healthy ovaries should not, as a rule, be sacrificed, as the comfort of the woman will probably be increased by leaving them. If, however, they are adherent to some adjacent structure and bleed after their separation, they may have to be removed, and if the hysterectomy is for malignant disease they should be excised.

Hysterectomy.—The operator having decided to remove the uterus, three courses are open to him: (1) To remove the uterus per abdomen by the sub-total method; (2) to remove the uterus per

abdomen by the total method; (3) to remove the uterus by the vaginal route.

There is no general agreement among operators as to which is the best routine method of performing abdominal hysterectomy for fibroids. The majority favour *sub-total hysterectomy*. With a large experience of both methods I think the sub-total to be the best. Those who practise total hysterectomy argue that better drainage is secured, but drainage is only necessary if there is any septic discharge already present, or to permit of the escape of blood. In the first place, the uterus should always be removed entire; and, secondly, if the operation of sub-total hysterectomy is properly carried out, there is no blood or serum to escape. Again, it is argued that the stump of the cervix may become septic. This is most unlikely if the aseptic technique is properly carried out, whereas when the uterus is entirely removed there is a direct communication between the vagina and the operation area, so that the latter becomes septic, and some of the ligatures slough out *per vaginam*. More serious objections to the sub-total method are that the stump of the cervix may later become carcinomatous, that it may be the seat of undiagnosed carcinoma at the time of the operation, or that the body may be likewise afflicted.

Statistics show that carcinoma of the cervix is less likely to attack women who have had their uterus removed by a sub-total hysterectomy for fibroids than those who retain possession of this organ, and this probably because so many women with fibroids are sterile, carcinoma in this position being a disease intimately associated with child-birth.

Cases, however, have been reported in which this distressing complication has supervened, and if there were not serious objections to the routine removal of the cervix, I should certainly on this account alone favour total hysterectomy.

If an adequate examination is made of the patient before the proposed hysterectomy, carcinoma of the cervix should not escape detection, unless it is of the intra-cervical variety, where the disease cannot be felt or seen. In these cases, however, there is nearly always a marked increase in the amount of blood lost over and above what she has regularly lost for some time, and this fact alone should always put the operator on his guard.

Then, again, the intra-cervical type will generally declare itself when the body is amputated from the cervix, and so is very unlikely to escape detection. Lastly, the danger of removing an unrecognised carcinoma of the body and leaving the cervix can be absolutely guarded against if the body is cut open directly it

has been removed; and here, again, the history will disclose a more profuse bleeding of recent origin.

Sub-total hysterectomy is the easier operation, can be performed in less time, is attended with less shock and with less danger of injuring the bladder, bowel, or ureters. Although in the hands of expert operators these increased dangers may be very slight, nevertheless they exist, and certainly when the operator is not so skilled they are very real ones. It has already been pointed out how easily the ligatures become infected in total hysterectomy.

Lastly, if the cervix is removed, the integrity of the vaginal vault is interfered with, there is a tendency for the vagina to become contracted, the ovaries may become adherent to the suture line in the peritoneum covering the vagina, all of which results may cause serious dyspareunia.

The fibroid may be small enough to allow of *vaginal hysterectomy*. In vaginal hysterectomy the shock is less, and if the uterus is acutely infected it is safer to remove it by the vagina, since the risk of infecting the general peritoneal cavity is less. The vaginal scar is hidden, the risk of ventral hernia obviated, and the distress caused by a stitch abscess, should one arise, is not so acute when the uterus is removed *per vaginam*; and, lastly, if the patient is very fat, the uterus is more accessible by the vagina. As a rule, however, the operation is much easier through an abdominal wound, and the increased facility accorded to the operator is associated with greater safety to the patient, since any complication, such as adherent intestine or omentum, can be dealt with; the bladder, rectum, and ureter are not so likely to be injured, and adhesions can be more safely separated.

Taking everything into consideration, I am of opinion that the abdominal method is the better one.

ABDOMINAL HYSTERECTOMY.

Preparation of the Patient.—In any case in which the abdominal cavity is to be opened for the removal of fibroids, the patient has to be carefully prepared as follows.

The patient should be kept in bed for a few days preceding the operation, during which time she should be well fed, the bowels regulated, the urine tested, and a vaginal douche of 1 in 4,000 biniodide of mercury given twice daily. The day before the operation she should have a bath, the pubes should be shaved, and the abdomen properly prepared by a thorough scrubbing of the operation area, especially the umbilicus, with soap and water, then

turpentine, next ether. It should then be covered with some sterilised lint, kept in position by a T-bandage. On the morning of the operation the operation area should be well painted with tincture of iodine, rubbed on with absorbent wool, and this should be repeated half an hour before the operation, the painted area being covered with sterilised lint. This iodine treatment can only be relied upon if the skin is quite dry.

The evening before the operation an aperient should be given,

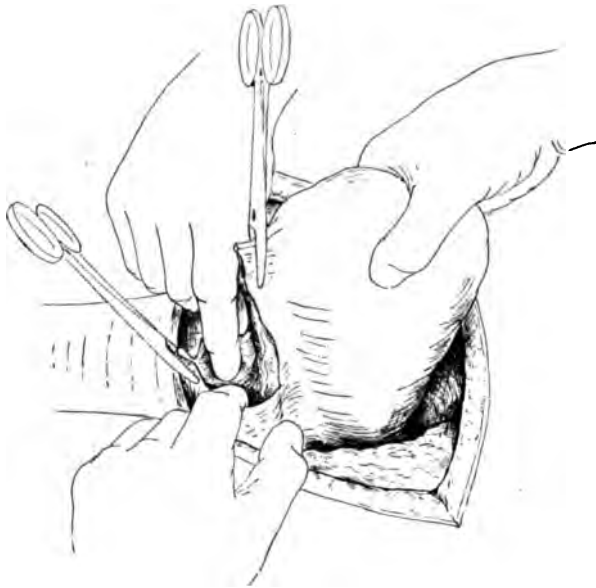


FIG. 1.—Hysterectomy. Broad ligament clamped, divided and being opened up to locate uterine vessels. (From Berkeley and Bonney's "Textbook of Gynaecological Surgery." Cassell.)

so that the bowels may act thoroughly, and on the morning of the operation a soap-and-water enema is administered. The patient should be dressed in a clean night-gown, flannel dressing-jacket, and a pair of woollen stockings reaching to the top of the thighs. False teeth should be removed before the anæsthetic, the hair dressed in a plait, and the bladder must be emptied by a catheter just before the patient gets on the table, and four hours before the operation she may have half a pint of beef-tea.

Instruments.—The following instruments will be needed. A scalpel; four short and two long Spencer Wells pressure forceps; four short Kocher's pressure forceps; two ring forceps; one dis-

secting forceps; one volsellum; two blunt-pointed scissors; one bladder sound; self-retaining retractor (Berkeley's); six curved needles (Bonney's), two No. 5, two No. 9, two No. 13; one straight 4-inch needle, or Michel's clip apparatus; three reels of silk, Nos. 1, 2 and 4; rubber drainage-tube, two sizes, $\frac{1}{4}$ -inch and $\frac{3}{4}$ -inch; a rubber catheter.

Sub-total Hysterectomy.—The routine method of performing



FIG. 2.—Hysterectomy. Uterine vessels clamped, peritoneal flaps reflected, and uterus being amputated. (From Berkeley and Bonney's "Textbook of Gynecological Surgery." Cassell.)

a sub-total hysterectomy for a fibroid of the uterus that does not involve the cervix or broad ligaments will first be described. The abdominal cavity is opened by a sub-umbilical incision, the length of which varies with the size of the tumour, care being taken to divide the fascia along the linea alba, and not to injure the bowel or bladder when the peritoneum is incised.

The abdominal cavity having been opened, the tumour is delivered, a large swab inserted behind it to prevent the bowels extruding, and the retractor is fixed in position. A pair of

pressure forceps is now applied to the upper border of the broad ligaments, internal to the ovaries if these organs are going to be saved, and on the ovarico-pelvic ligaments, external to the ovaries, if they are going to be removed. A second pair in each case is applied about 1 inch internal to the first pair, so that when the tissue is divided any hæmorrhage from the uterine side may be controlled. A pair of pressure forceps is likewise applied to the round ligaments.

The round ligaments and top of the broad ligaments are now divided, and the latter are further opened up with the fingers till the uterine vessels come into view, when they are clamped with pressure forceps (Fig. 1).

A flap of peritoneum is next dissected downwards off the anterior

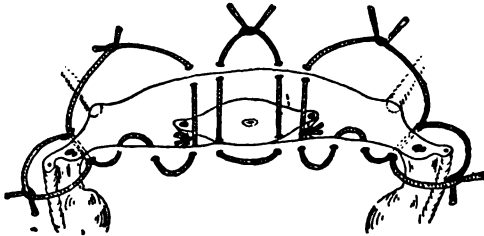


FIG. 3.—Hysterectomy. Uterus amputated, uterine vessels secured, ovarian vessels secured. Mather's suture approximating peritoneal flaps. (From Berkeley and Bonney's "Textbook of Gynæcological Surgery." Cassell.)

surface of the uterus, care being taken not to injure the bladder when doing so.

The operator now pulls the uterus with the tumour towards his side, and amputates it just above the point where the uterine vessels are clamped, after which the vessels are secured as follows (Fig. 2).

A piece of No. 4 silk is first tied round the uterine artery below the forceps clamping it, and then the cervical tissue on each side is transfixed with a curved needle threaded with No. 4 silk, the suture being made to surround the vessels below the point where the artery has previously been ligatured.

If there is any oozing from the cervical stump, this must be arrested with mattress sutures.

The ovarian vessels and round ligaments are next secured. There are various methods of doing this, but the best is as follows. A curved needle is tied on a long piece of No. 4 silk, the ends being of

equal length. The needle and ligature are then passed through one broad ligament between the forceps, clamping the ovarian vessels and the round ligament. The ligature is now cut and the needle left attached to one-half of it. The needle-free half of the ligature is used to ligate the ovarian vessels and Fallopian tube, after which the remaining half of the ligature is, by means of the attached needle, run through the posterior layer of the broad ligament as a pleating suture; it is then made to transfix the outer end of the

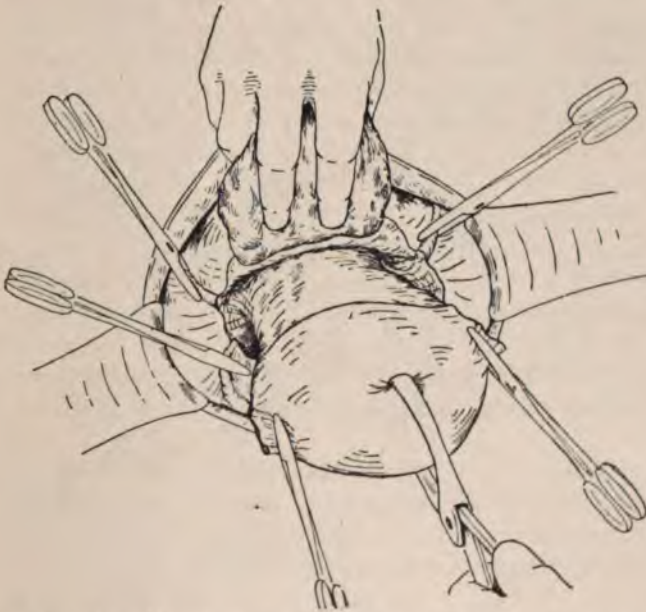


FIG. 4.—Hysterectomy. Reflecting the bladder from the anterior vaginal wall. (From Berkeley and Bonney's "Textbook of Gynecological Surgery." Cassell.)

cervical stump from before backwards and the anterior peritoneal flap, after which the needle is cut free and the ligature tied, with the result that the round ligament is firmly secured, and the gap in the broad ligament obliterated (Fig. 3).

The opposite side is treated in a similar manner.

The raw surface covering the stump is then covered by approximating the peritoneal flaps by means of one or more mattress sutures.

Any blood that has collected in Douglas's pouch is next removed, the sponges and forceps are counted, and the appendix is examined to ascertain if it is healthy; if not, it is removed.

The abdomen is lastly closed by three layers, the peritoneum by a No. 2 silk continuous suture, the fascia by No. 4 silk interrupted sutures, and the skin by Michel's clips or by a No. 4 silk continuous suture.

The abdominal wound is now covered with sterilised gauze, over which is placed a pad of sterilised wool, and the two are kept in position by a many-tailed binder. As some blood may have trickled

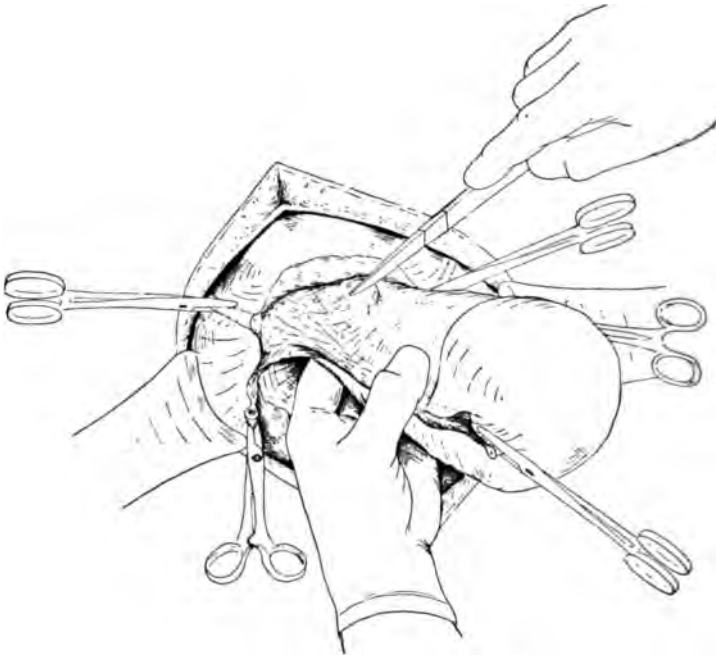


FIG. 5.—Hysterectomy. Broad ligaments divided. Uterine and ovarian vessels clamped, bladder reflected and the anterior vaginal wall being incised. (From Berkeley and Bonney's "Textbook of Gynæcological Surgery." Cassell.)

through the cervical canal into the vagina, this tube is swabbed with wool held in long forceps, after which the bladder is emptied and the patient returned to bed.

The skin suture is removed on the seventh day and the wound redressed. If Michel's clips have been used, these are taken out on the fifth day.

Precautions to be Taken in Sub-total Hysterectomy.—The operator must be certain when he is opening the abdominal cavity that he does not mistake the deeper layers of the sub-peritoneal fascia or the bladder for the peritoneum.

The first mistake is likely to arise if the tumour is adherent to the parietal peritoneum, and the operator mistaking the parietal peritoneum for that covering the tumour proceeds to strip the parietal peritoneum from the fascia. Again, the bladder may be dragged by the tumour high up into the wound. The bladder may also be wounded when enlarging the peritoneal opening and when dissecting down the anterior flap of peritoneum unless adequate care is taken.

The intestines or omentum may also be wounded when the peritoneal cavity is opened, especially if they are adherent. If the tumour is fixed by adhesions, great care must be taken in separating these to see that the bowel is not injured, and all bleeding points must be secured with ligatures. If the bowel is injured, special care must be taken in suturing it, as unless this is efficiently done a faecal fistula may result.

Total Hysterectomy.—There are various ways of performing total hysterectomy; the following will be found the easiest.

The steps of the operation down to and including the clamping of the uterine vessels and reflection of the anterior peritoneal flap are the same as those already described for sub-total hysterectomy.

The next step consists in reflecting the bladder from the vagina which can be easily accomplished by wiping it off carefully with a swab to a distance somewhat below the level of the vaginal cervix (Fig. 4).

With a scalpel the anterior vaginal wall is now incised and a hole made large enough to insert two fingers. With the fingers in the vagina as a guide, the vaginal wall is then carefully divided right round, care being taken to keep as close to the cervix as possible so as to avoid injuring the ureters (Fig. 5).

The uterine vessels are next ligatured in the manner already described for sub-total hysterectomy, and if they have been cleanly clamped so that very little tissue other than the vessels is in the grip of the forceps, the ligature should be made to transfix the lateral vaginal angle, and the ends are then brought round under the forceps and tied. If, however, the mass of tissue held in the grip of the forceps is at all bulky, it is better to use a long ligature with needle tied in, and having transfixed the tissue under the uterine vessels to divide the ligature, bringing the free ends round under the forceps and so securing the vessels, and with the other half to which the needle is attached to transfix the lateral vaginal angles and brace this part up. The vagina should not be closed.

The ovarian vessels and round ligaments are then secured in the manner already described, after which any gap in the broad liga-

ments and the open end of the vagina are closed over by suturing at the sides the anterior layer of the broad ligament to the posterior layer, and in the centre the anterior flap of peritoneum to the posterior vaginal wall. This can be accomplished with one continuous suture of No. 4 silk, commencing at the point where the ovarian vessels are tied on one side and continuing across the pelvis, finishing at a similar spot on the opposite side. The pelvis having been swabbed clear of any blood that may have escaped, the

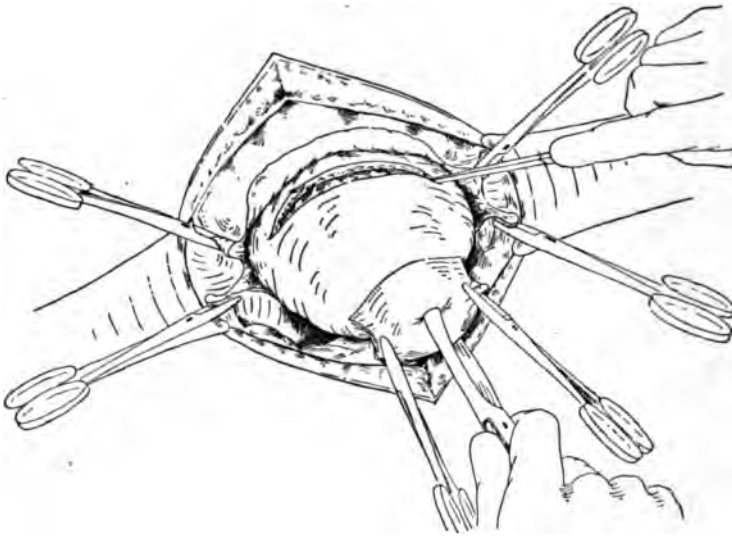


FIG. 6.—Hysterecomy for central cervical fibroid. Broad ligaments cut and divided, uterine vessels clamped, bladder pushed down. Capsule of tumour being incised. (From Berkeley and Bonney's "Textbook of Gynæcological Surgery." Cassell.)

swabs and forceps are counted, the appendix examined, and the abdominal wound closed in the manner already described.

The abdominal wound is dressed in a similar way to that already described for sub-total hysterecomy.

Precautions to be Taken in this Operation.—As the vagina is being divided care must be taken not to injure the bladder, ureters, or rectum. The ureters may also be ligatured or cut when the uterine vessels are secured.

During the second week in a certain percentage of cases there will be slight fever and offensive discharge, due to infection of the operation area from the vagina, and it is for this reason that the vagina should be left open. In a few of these cases also the dis-

charge is kept up by separation of the ligatures in the lateral vaginal angles and round the uterine vessels, and will not cease till they are discharged.

Hysterectomy for a Cervical Fibroid.—The method already described for sub-total hysterectomy is unsuitable for dealing with a cervical fibroid, because the uterus would have to be amputated through the cervical growth, a portion of which would consequently be left behind.

The routine method for total hysterectomy is likewise unsuitable,

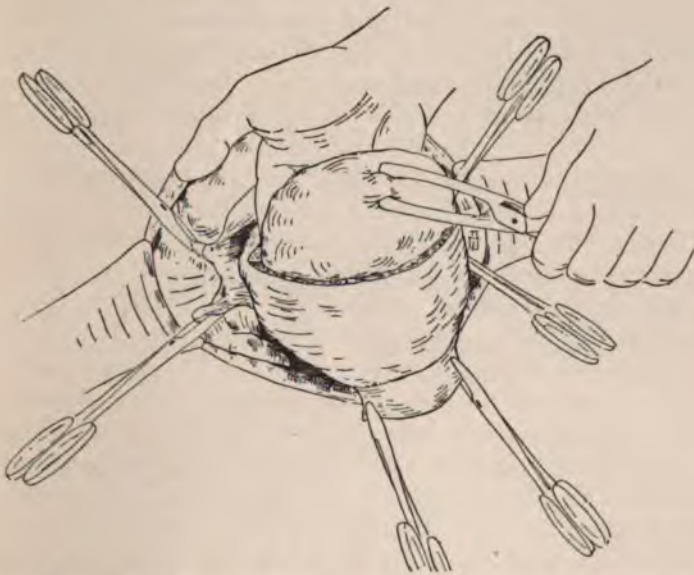


FIG. 7.—Enucleation of central cervical fibroid. (From Berkeley and Bonney's "Textbook of Gynæcological Surgery." Cassell.)

since, if the tumour is at all large, it will be impacted in the pelvis, and the vagina cannot be reached until the tumour is removed out of the way.

Again, no one method will be suitable for all varieties of cervical fibroids, since the situations of these tumours alter the anatomical relations very considerably. As cervical fibroids may be central or may grow from the front, back or sides of the cervix, and as they may be single or multiple, the method of their removal varies somewhat in each particular case.

Hysterectomy for a Central Cervical Fibroid.—A central cervical tumour expands the cervix in all directions.

The abdomen having been opened and the swab inserted, the ovarian vessels and broad ligaments are clamped in the usual way. The tumour may have raised the uterine vessels, so that they are almost in apposition with the ovarian vessels, in which case the clamp should include both sets.

The peritoneum in front of the tumour having been incised well above the bladder, it is reflected downwards, and together with the bladder is separated from the supra-vaginal cervix.

The capsule of the tumour is then incised in front, after which

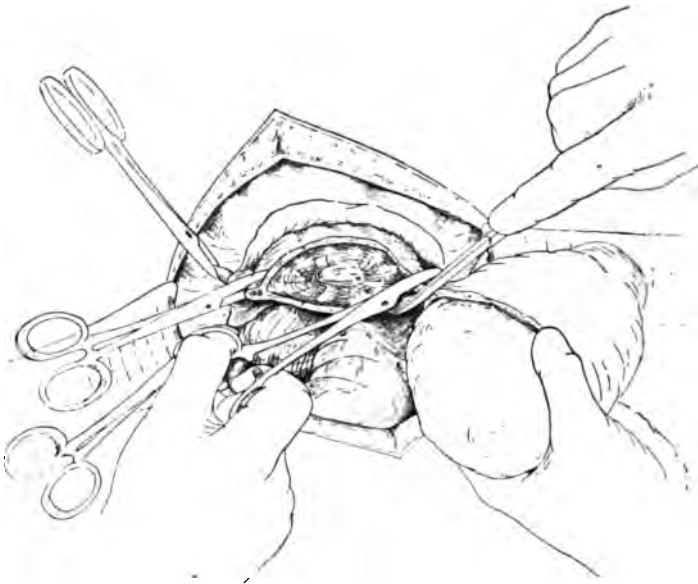


FIG. 8. -Enucleation of central cervical fibroid. Incision of capsule continued round to the back and tumour removed. The uterine vessels on operator's side have been previously secured. (From Berkeley and Bonney's "Textbook of Gynaecological Surgery." Cassell.)

the fingers are inserted between the tumour and its capsule, and, assisted by a volsellum attached to the tumour, the latter is partly enucleated (Figs. 6 and 7).

The anterior incision in the capsule is then extended to the left, when the uterine vessels on the assistant's side are clamped.

The incision is next carried round the back of the expanded supra-vaginal cervix, the tumour being further enucleated. Lastly, the uterine vessels on the operator's side are clamped and cut, and the posterior and anterior incision being joined, the uterus together with the tumour is removed (Fig. 8).

The ovarian and uterine vessels are now ligatured in the manner previously described.

The stump consists of the expanded supra-vaginal cervix. Any excess of this is cut away, after which the cavity is obliterated with mattress sutures.

The broad ligaments and peritoneal flaps are next sutured in the manner previously described, and lastly the abdominal wound is closed in the usual way.

Precautions to be Taken in the Operation.—The chief danger in the operation is that the altered relations of the bladder may not be recognised, with the result that this viscus will be opened either when reflecting the peritoneum anteriorly or when clamping the round ligaments, as, on account of the backward displacement of the uterus, the round ligaments may be mistaken for the broad ligaments, and the cut dividing these being carried too far forwards will open the bladder.

Hysterectomy for an Anterior Cervical Fibroid.—The abdomen being opened and the swab inserted, the round ligaments are clamped and divided at their junction with the uterus. The index finger is now inserted under the peritoneum in the neighbourhood of the cut end of the round ligament and pushed across the tumour to the other side, thus undermining the peritoneum and demarcating its line of firm attachment to the uterus. The peritoneum is then divided with scissors at this level. The peritoneum is now pushed down till the uterine vessels on the side opposite the operator come into view, when they are clamped and cut.

The incision in the capsule is then carried round behind the tumour, the tumour and uterus being pulled meanwhile over towards the operator until the uterine vessels of his side come into view, when these are clamped and divided, and the uterus together with the tumour is removed.

The stump, which consists of the expanded supra-vaginal cervix, is trimmed up, and its cavity is obliterated with one or more mattress sutures.

The remainder of the operation is completed in the manner already described.

At times it is possible to enucleate the whole tumour, after which the uterus is amputated, and the operation completed in the manner already described for sub-total hysterectomy. In this case, however, there will be two cavities left, one the supra-vaginal cervix or vagina, according to whether the hysterectomy was total or not, and the other the lower pole of the capsule of the tumour. The tumour cavity is closed by a series of mattress sutures.

Precautions to be Taken in this Operation.—The operator must be sure that his fingers are inserted between the capsule and tumour when he starts the enucleation, for he may mistake the peritoneum and the subjacent connective tissue for the capsule, and so fail to enucleate the tumour, or he may make the incision so deep that not only is the capsule opened but the muscle of the tumour is cut into, and the fingers being inserted below the layer of cut muscle enucleation becomes impossible.

The methods described for the removal of cervical fibroids have been on the assumption that the hysterectomy was of the sub-total variety. Should the operator wish to perform total hysterectomy, the steps will be the same as already described up to the enucleation of the tumour, after which the vagina is opened in the manner described under Total Hysterectomy, and the operation completed on the lines there laid down.

Hysterectomy for a Posterior Cervical Fibroid.—If a cervical fibroid is growing in the posterior surface of the cervix it most commonly flattens the pouch of Douglas and presses the rectum against the cervix, or rarely it obliterates the pouch of Douglas by growing under the peritoneum at the bottom of the *cul-de-sac* and raising the membrane off the rectum.

When the Pouch of Douglas is Flattened.—The abdomen having been opened and the ovarian vessels and round ligaments clamped and cut in the usual way, the uterus is dragged forwards and the peritoneum, together with the capsule at the junction of the tumour and the posterior surface, is incised and reflected.

The fingers of the left hand are now inserted between the tumour and its capsule, and the former is then partly enucleated.

The anterior flap of peritoneum having been reflected, the tumour and uterus are pulled up with a volsellum, and the uterine vessels on each side clamped and the uterus amputated.

The operation is finished in the way described under Anterior Cervical Myoma.

When the Pouch of Douglas is Obliterated, the uterus will be found raised on the tumour in a position of retroversion. The cervix and upper part of the vagina being the most accessible parts, the operation is best conducted as follows.

After the abdominal cavity has been opened, the round ligaments are clamped and cut. The peritoneum is next stripped back and also the bladder till the vaginal wall is identified. The anterior vaginal wall is next incised and a volsellum is passed into the vagina; the cervix is seized and drawn out of the vagina. The cervix is next drawn upwards and backwards and the rest of the

vaginal mucous membrane at its junction with the cervix is divided. The cervix being further dragged upon, the base of the broad ligaments on each side is cut, together with the uterine vessels, which are seized with pressure forceps when they are seen. The operator will now be able to lift the uterus well up, and the posterior cervical fibroid can be separated from the rectum by the fingers. The ovarian vessels are next clamped, the posterior layer of peritoneum at its junction with the uterus divided, and the uterus and tumour thus removed. The operation is finished in the way described under Sub-total Hysterectomy.

BROAD LIGAMENT FIBROIDS.

Broad ligament fibroids may be divided into true and false.

True Broad Ligament Fibroids may be found in the round ligament, ovarian ligament, and in the connective tissue round the ovarian or uterine vessels. They are quite separate from the uterus.

The method of dealing with a true broad ligament fibroid depends on its size. If it is small, it can be enucleated; if it is large or adherent, as it is more likely to be when springing from the connective tissue round the vessels, it must be removed together with the uterus in the manner described under Hysterectomy for False Broad Ligament Tumours.

Enucleation for True Broad Ligament Fibroids.—If the tumour is small, it can be treated in the following way.

The abdominal cavity having been opened in the usual way, the tumour comes into view, distending the broad ligament on one or other side. The peritoneum covering the tumour is incised and a small opening made in the broad ligament. The operator enlarges the opening with his fingers, and, passing these in between the tumour and the peritoneum, gradually enucleates the tumour with the aid of a volsellum, pulling on the tumour with the other hand. Any bleeding spots having been securely ligated, the cavity remaining in the broad ligament is closed as follows. If the cavity is not very deep it may be sufficient to unite the cut edges of the peritoneum with a continuous suture. If the cavity is deep it must be obliterated by sewing the walls together with a continuous suture of No. 2 silk. The abdomen is then closed in the usual manner.

The oozing may be free, and so much difficulty may be experienced in stripping the peritoneal capsule of the cyst that it will have to be sutured to the abdominal wound and then packed with gauze and drained.

The uterine vessels lie under the tumour and to its inner side, and the ureter is displaced inwards. Unless great care be taken they may be divided.

A False Broad Ligament Fibroid is one which, whilst it is really growing from the cervix or the body of the uterus, projects out into the broad ligament.

Hysterectomy for False Broad Ligament Fibroid.—The abdomen being opened and the swab inserted, the ovarian vessels and broad ligament on the free side are clamped and divided. The round ligament on the tumour side having been clamped, the peritoneum on the anterior surface of the uterus is incised, and the operator forces his index finger through the opening thus made up under the Fallopian tube and ovarian vessels, which are then clamped by the pair of pressure forceps and divided between them. The anterior peritoneum and bladder having been reflected downwards, the uterine vessels on the free side are clamped and divided, after which the uterus, by means of a volsellum, is pulled over towards the tumour and then cut through at the level of the internal os. At this stage of the operation the uterine vessels of the tumour side will become evident, and they are at once clamped, if possible, before they are divided. The operator now passes his fingers under the lower surface of the tumour and frees it. The ovarian and uterine vessels are then secured in the manner already described, after which the cavity in the broad ligament has to be dealt with. If the cavity is small, it can simply be left covered by the layers of the broad ligament as they are sutured. If the cavity is a large one, then it should be obliterated by sutures from below upwards. The pelvic cavity having been swabbed clean, the abdomen is closed in the manner already described.

Broad ligament fibroids, if at all large, alter the anatomical relations of the pelvis to a remarkable extent. Thus the broad ligament may be so distended that the Fallopian tube is tightly stretched over it. The tumour as it grows strips the peritoneum off the pelvic wall, and may extend between the layers of the sigmoid meso-colon, so that the bowels appear to be adherent to the tumour. The relation of the uterine vessels and ureter to these tumours must also be particularly noted. In false broad ligament fibroids the uterine vessels lie above and to the outer side of the tumour, and may even run parallel with the ovarian vessels. In false broad ligament fibroids the ureter is pressed outwards to the pelvic wall, and runs as a rule under the tumour, more rarely in cervical fibroids over the tumour.

VAGINAL HYSTERECTOMY.

The patient should be prepared in a manner similar to that described under Abdominal Hysterectomy, only in this case the entire vulva should be shaved.

The operation may be done by ligatures alone, or by clamping and dividing the broad ligament in pieces and afterwards ligaturing it, or lastly by clamping and dividing the broad ligaments and leaving the clamps on. Taking everything into consideration, the first is the best and safest method.

Instruments.—A scalpel; six long Spencer Wells pressure forceps; four long Kocher pressure forceps; two ring forceps; one dissecting forceps; two volsella; two blunt-pointed scissors; one bladder sound; six curved needles (Bonney's), two No. 5, two No. 9, two No. 13; three reels of silk, Nos. 1, 2, and 4; a rubber catheter; a douche apparatus; Clover's crutch; Auvard's speculum; two vaginal retractors; Worrall's blunt-pointed needle.

Operation by Ligature only.—The vagina should be well swabbed with soap and water by means of swabs held in forceps, and douched with a solution of biniodide of mercury (1 in 2,000).

Auvard's speculum is inserted into the vagina, and the cervix is now seized with a volsellum, or alternatively the cervical canal can be closed with some No. 6 silk and the ends then used as a tractor. Any urine having been drawn off with the catheter, the position of the bladder is now carefully mapped out with the bladder sound. As the bladder will have to be stripped off the front of the cervix to enable the utero-vesical pouch to be opened, a note must be made when the sound is in the bladder of how far down its point reaches; otherwise the bladder may be opened during its reflection. The uterus is now pulled down as far as possible, and the mucous membrane covering the anterior surface of the cervix is incised just below the point where the tip of the sound reached. The bladder is then separated from the uterus by means of the handle of the scalpel, scissors, or the index finger. When the utero-vesical reflection of peritoneum is reached, it is cut through with a pair of blunt-pointed scissors, using the left index finger as a guide. An opening into the peritoneal cavity having thus been made, it can be enlarged by tearing it with the fingers. The cervix is next drawn forwards and the mucous membrane covering its posterior surface is incised at the level of the posterior vaginal fornix. The mucous membrane is then separated till the utero-rectal reflection of peritoneum is reached, when this is cut through with blunt-pointed scissors. The hole thus made is now enlarged and the incision in the mucous membrane at the back is next carried round till it meets the one in

front. A swab tied to a piece of tape is passed into the peritoneal cavity through the posterior opening to keep the small intestine from prolapsing into the wound. The uterus is next pulled to one side by an assistant, and the operator having identified the position of the uterine artery with his finger and thumb, passes his index finger through the posterior opening, and by its means steadies the lower part of the broad ligament, where it is in apposition with the cervix. A Worrall's needle is now made to transfix the broad ligament from before backwards, well above the level of the uterine artery and as near the cervix as possible. The needle having been tilted so that its end impinges on the index finger, a ligature of No. 4 silk is attached to it. The needle is then withdrawn and disengaged from the silk, after which the ligature is tied, securing the artery. The tissue between the ligature and the cervix is next divided with scissors, after which the uterus is pulled over to the opposite side, and the corresponding uterine artery dealt with in a similar way. The uterus can now be drawn lower down so that some more of the broad ligament comes within reach, and this is transfixed and tied and divided on each side as before.

The last ligature to be passed on each side, the highest one, should be used double, so that one half may be passed over the top of the broad ligament, thus ligaturing the Fallopian tube and the ovarian vessels, whilst the other half secures the round ligament. The uterus is thus freed, and if there are any oozing points they must be secured with pressure forceps and ligatured with No. 4 silk. The number of transfixing ligatures necessary to apply on each side depends upon the size of the uterus, and partly on the skill of the operator; but, at any rate, all the bleeding spots must be secured.

The vagina is then swabbed out with some biniodide of mercury (1 in 2,000), after which the intestinal plug is removed. The ends of the ligatures (if cut at all) are better left long till the termination of the operation, after the operator is satisfied that all bleeding has stopped, as till then they are very useful as tractors to pull down pieces of the broad ligament to secure any bleeding spot.

A piece of sterilised gauze should be passed into the utero-rectal pouch to act as a drain, and the cut edges of the vagina will fall together. Lastly a pad and T-bandage are applied. The gauze should be removed in forty-eight hours.

After the gauze-packing is removed the vagina should be carefully wiped out twice a day with swabs soaked in 1 in 5,000 biniodide of mercury. At the end of a week vaginal douches of the same solution may be given, but at a very low pressure, till the discharge (which at this time will become a little offensive) has ceased.

Precautions to be Taken in this Operation.—If the connective tissue between the bladder and cervix is denser than usual, or if the operator has cut through the mucous membrane into the muscle without recognising the fact, there will be difficulty in reflecting the bladder. If the first condition is the cause of the difficulty, the bladder must be carefully separated by a series of small snips with the scissors, or the operator can pass his index finger outwards, where the cellular tissue is much looser, and can then work inwards, striking perhaps a better place of cleavage.

At times there is difficulty in opening the utero-vesical pouch owing to the fact that the index finger which was passed to steady the peritoneum pushes this membrane farther away. In this event it is best to pass up a pair of pressure forceps and seize a piece of peritoneum, which can then be pulled down and incised *in situ*. After the posterior incision in the mucous membrane has been made, the operator must be careful that he does not separate the rectum and vagina instead of cutting right through into the utero-vesical pouch.

If there is much oozing from the posterior cut edges of the vagina, it can be arrested by suturing the cut edges of peritoneum and mucous membrane together.

If the uterus is in any way held by adhesions, or if it is large, there may be difficulty in drawing down the uterus after the base of the broad ligaments have been incised, in which case great difficulty may be experienced in passing the highest ligatures. If adhesions are the source of the trouble, they must be broken down with the finger, and if the Fallopian tubes or ovaries are diseased, they must be removed by passing the upper ligature on their other side.

If the difficulty is due to the size of the uterus, this organ must either be cut in half down the middle, and each half removed separately, or the fundus of the uterus can be seized with the forceps and perhaps pulled through the anterior opening, so that the top of the broad ligaments will then come into view and can be cut off. The commonest accident associated with vaginal hysterectomy is a wound of the bladder. This can nearly always be avoided by emptying the bladder before commencing the operation and identifying its limits with the sound. If the bladder is wounded, it requires suturing.

When opening the utero-vesical pouch the rectum may be wounded, and, if so, it must be sutured. The small intestines may also be wounded under similar circumstances. If there is any bleeding which cannot be controlled with ligatures, a pair of forceps

must be left on the bleeding spot. They should be removed in thirty-six hours. Free bleeding is an indication that some large vessel is patent, and this must be secured. Unless care is taken to pass the ligature controlling the uterine artery as near the cervix as possible, the ureter, which is less than 1 inch from that structure, may be included in the ligature. It may also be divided when the broad ligament is being cut.

MYOMECTOMY.

Abdominal Myomectomy.—The patient is prepared in the same way as for abdominal hysterectomy, and the instruments necessary are those used in abdominal hysterectomy.

Operation when the Fibroid is Pedunculated.—The abdomen having been opened and the swab inserted, the tumour and uterus are pulled up through the wound. The pedicle is next clamped with pressure forceps, after which the peritoneum is incised on the tumour side of the forceps and reflected. The tumour is then enucleated, and the bleeding that results is arrested by mattress sutures passed deep to the raw surface. The incised edges of peritoneum are then united with a continuous silk suture and the abdominal wound closed. If the pedicle is very thin it can be transfixed and tied in the same way as an ovarian pedicle. If there is difficulty in enucleating the tumour and the pedicle is thick, a wedge-shaped incision must be made in the pedicle, and its cut edges afterwards united with mattress sutures.

Operation when the Fibroid is Sessile.—In this case the peritoneum and capsule covering the tumour must be incised. The handle of a scalpel is now passed through the incision and the tumour separated from its capsule, and by dragging on the tumour with the aid of a volsellum the fibroid is enucleated. All bleeding is arrested by means of mattress sutures passed deep to the raw surface, after which the peritoneal edges of the capsule are approximated with a continuous silk suture, and the abdominal wall is closed in the usual way.

If the cavity is large it can be closed with buried silk sutures, otherwise blood may ooze into it. If the bleeding cannot be controlled, a hysterectomy may have to be performed.

FIBROID POLYPI.

Fibroid Polypus of the Cervix.—If the polypus is small it can be held with forceps and its pedicle severed with scissors, and

as the muscle in the pedicle contracts round the vessels there will be no bleeding.

If the pedicle is out of reach, the tumour must be steadied with volsellum forceps, and its capsule then incised and reflected with a



FIG. 9.—Removal of fibroid polypus, too large to be removed by cutting through its pedicle direct. The capsule being incised and reflected, preparatory to removing the tumour by *morcellement*. (From Berkeley and Bonney's "Textbook of Gynaecological Surgery." Cassell.)

scalpel. The tumour can then be cut free with scissors, after which the collapsed capsule can be twisted to secure the vessels.

Fibroid Polypus of the Body.—If the pedicle can be reached, the tumour is removed in a manner similar to that already described.

If a polypus is suspected and the cervix is not dilated, this procedure must be carried out first, when the diagnosis will be

confirmed or otherwise. If a polypus is present, it must be removed by severing its pedicle with a pair of scissors. If the cervix is partly dilated and the polypus is being extruded, it should be steadied with a volsellum, and an effort made to force the finger up between the tumour and cervix till the pedicle is reached, in which case the polypus should be drawn down and the pedicle severed with scissors.

If the tumour is so large that the pedicle cannot be felt, it must be removed piecemeal, small portions of the tumour being excised until the pedicle can be reached (Fig. 9).

The operator must be very careful not to mistake an inverted uterus for a fibroid polypus. This has been done on many occasions with fatal results, due to the hæmorrhage resulting after amputation of the uterus. A careful bi-manual examination will disclose that the body of the uterus is absent from its normal position, and especially if the patient is thin, a cup-shaped depression may be felt in the place of the uterine body. Then if the uterus is inverted the sound will pass less than $2\frac{1}{2}$ inches, whilst if a fibroid polypus is present the sound will pass farther than normal. If the pedicle of the polypus is adherent to the cervical canal, the sound would pass less than normal, as it would if the point of the sound caught against it at its junction with the uterus.

When the polypus is pulled upon preparatory to its removal, the uterine wall at the point where the stalk is attached may be partially inverted, so that the operator when removing the tumour must be certain he is cutting through the stalk and not through a piece of inverted uterus.

If there is any bleeding and it cannot be arrested with hot douches, the uterine cavity should be plugged with sterilised gauze, which should be removed the next day. The vagina should then be douched twice daily with biniodide of mercury (1 in 4,000).

Vaginal Enucleation.—This operation is indicated when the fibroid is of the sub-mucous variety, but it has certain limitations. It should not be attempted if the meridian of the tumour is not free in the uterine cavity, if the tumour is larger than an orange, or if there are interstitial or sub-peritoneal tumours in addition.

If on dilatation of the cervix a sub-mucous fibroid is detected which fulfils these requirements, the index finger of the left hand should be passed up to it, after which a scalpel or pair of scissors is passed along the index finger, and an incision is made over the mucous membrane covering the tumour sufficiently deep to open its capsule and large enough to admit the point of the finger. The index finger of either hand is now pushed through the hole in the capsule

and the tumour is enucleated, the external hand pressing down the uterus so as to steady it and bring the tumour more within reach. When the tumour has been freed, it must be seized with a volsellum and delivered through the cervical canal.

Difficulty may be encountered if the capsule is adherent, in which case the tumour must be twisted in various directions, and scissors employed if necessary to snip it free. Again, if the tumour is larger than a tangerine orange, it cannot be delivered through the dilated cervix. In this case the fibroid must therefore be cut up into small pieces (*morcellement*), or the cervix may be incised in front, together with the anterior surface of the uterus, as far as the peritoneal reflection, the bladder being pushed off the uterus first. It should be remembered that adenomyomata, which are generally sub-mucous, cannot from their symptoms or signs be distinguished from fibroids. As, however, they have no proper capsule, they cannot be enucleated.

Morcellement.—If the tumour has dilated the cervix and is projecting into the vagina, it is best to cut away its lower part for 1 inch or so and then start the enucleation. After the capsule has been stripped up a little, as much as possible of the denuded portion of the tumour is removed with scissors. The volsellum is then passed up under the capsule and portions of the tumour seized, pulled down, and cut away until all the tumour is removed, after which the capsule is pulled down by a pair of ring forceps and cut away as near the uterus as possible.

If the operator misjudges the size of the tumour, he may not be able to remove it. As a result there may be serious hæmorrhage or sepsis. If, therefore, it is found impossible to complete the removal of the tumour, it is safer to finish the operation by a hysterectomy.

If the hæmorrhage is severe, it must be arrested by hot douches or gauze-packing.

Septic infection resulting from the operation is rare with the modern aseptic technique. Nevertheless, it occasionally supervenes, generally because the tumour itself is already septic, in which case, when the tumour is removed, the uterine cavity should be thoroughly irrigated with 1 in 4,000 biniodide of mercury and afterwards packed with iodoform gauze. During the enucleation the uterine wall may be perforated. If the uterine cavity is clean, as a rule no harm will result, and unless the hole is large or there is free hæmorrhage, the uterus may be lightly packed with gauze and the patient carefully watched. If, however, a septic tumour is being enucleated, the hole is large, or a piece of bowel prolapses through it, vaginal hysterectomy should be performed.

ADENOMYOMA.

Adenomyomata are found alone or in association with fibroids. They resemble these tumours in their age limit, symptoms and signs, and, like fibroids, are often associated with sterility.

Usually adenomyomata occur in the body of the uterus, and produce a symmetrical enlargement somewhat softer than fibroids; but they are sometimes limited to one surface, so that they may be sub-peritoneal or sub-mucous.

An adenomyoma cannot be diagnosed without a microscopical examination, when it is found that the growth consists, like a fibroid, of a stroma of muscle fibres and connective and fibrous tissue. Projecting into the substance of the tumour from the endometrium and scattered through its tissue can be seen gland tubules lined with a layer of columnar epithelium. It has no capsule. These tumours, which have only of late years been identified, are more common than is generally supposed. An examination of all supposed fibroids removed would show that 5·7 per cent. were adenomyomata (Cullen).

Adenomyomata are removed by hysterectomy under the assumption that they are fibroids causing too much hæmorrhage, or rarely, after an attempt has been made to enucleate them, but failed because of the absence of a capsule, a similar diagnosis having been made.

MUCOUS POLYPI.

Mucous Polypus of the Cervix.—The vagina is douched with biniodide of mercury (1 in 4,000) and Auvard's speculum is inserted. The cervix having been steadied with a volsellum, the polypus is seized with a pair of ring forceps and twisted off. Generally there is no bleeding to signify following the removal of the polypus. If there is free oozing, the actual cautery or carbolic acid applied to the stump is sufficient, or the cervical canal can be plugged with gauze. It is good practice to scrape the cervical canal with a sharp spoon as the lining membrane is always unhealthy. If the operator finds that the cavity of the uterus is enlarged, he should in addition dilate the cervix and digitally examine the interior, since there may be one or more polypi of the body of the uterus in addition.

Mucous Polypus of the Body.—If a mucous polypus of the body of the uterus is suspected, the cervix should be dilated, and if the diagnosis is verified, the polypus should be seized with a pair of ring forceps and twisted off. The uterus should always be curetted, as the polypus is merely a local indication of the general

disease of the endometrium. Any troublesome bleeding may be checked with hot douches and packing with gauze.

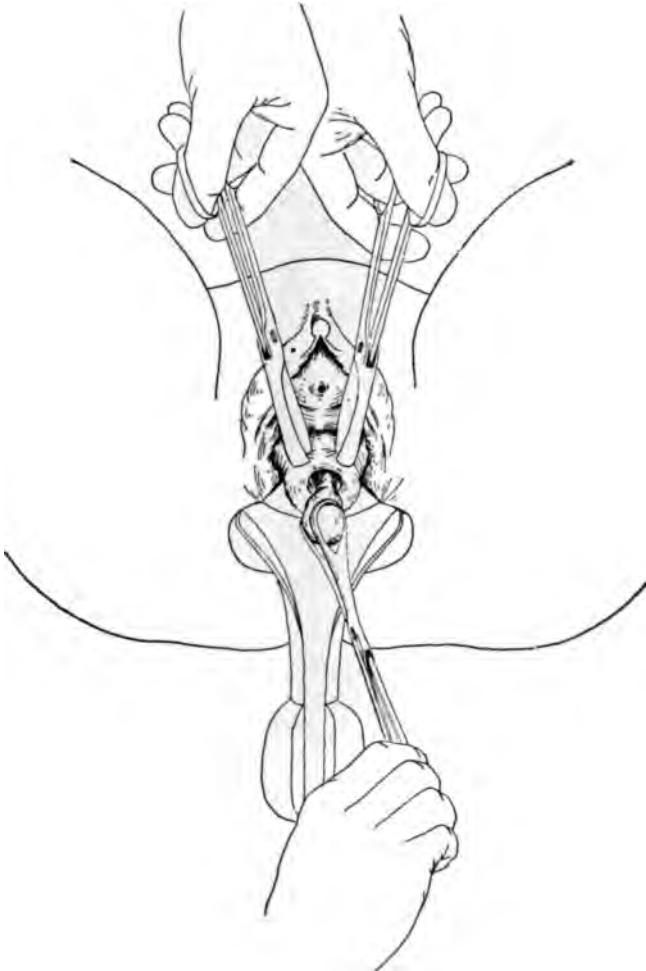


FIG. 10.—Removal of a mucous polypus. (From Berkeley and Bonney's "Textbook of Gynæcological Surgery." Cassell.)

If the uterus has been packed, the gauze is renewed the following day.

Vaginal douches of biniodide of mercury (1 in 4,000) should be given twice daily after the operation, or one of lysol (one drachm to the quart).

COMYNS BERKELEY.

FISTULÆ OF THE UTERUS.

FISTULÆ of the uterus are very rare in comparison with the frequency of vaginal fistulæ. The following varieties have been met with: Utero-vesical, utero-ureteral, utero-intestinal, utero-abdominal.

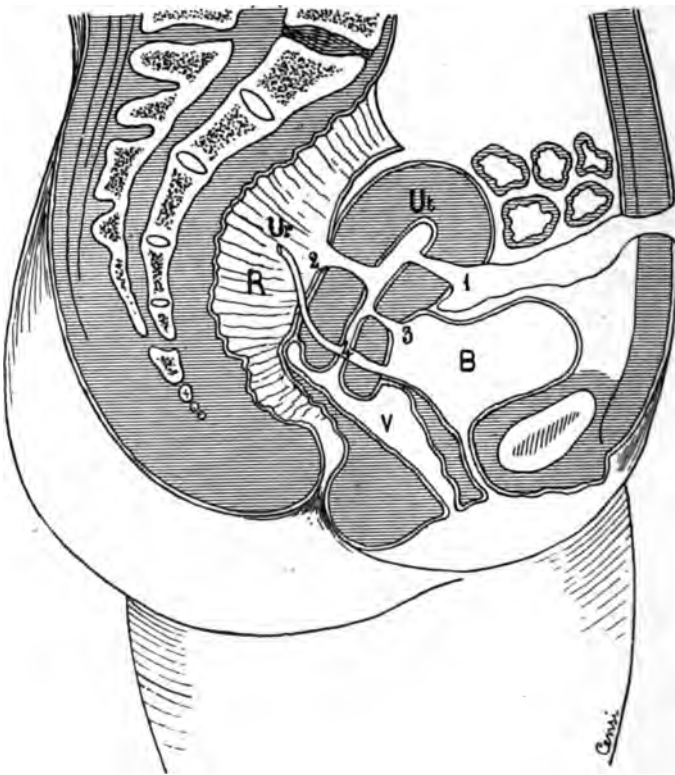


FIG. 1.—Fistulæ of the uterus (diagrammatic). Ut., Uterus; Ur., Ureter; R., Rectum; B., Bladder; V., Vagina. (1) Utero-abdominal. (2) Utero-intestinal. (3) Utero-vesical. (4) Utero-ureteral.

Sometimes more than one of these varieties is found in the same patient, but perhaps more frequently the uterine fistula is associated with a vaginal one.

Fistulæ are produced by three different causal factors: (1) Injury; (2) malignant disease; (3) infective processes.

Fistulæ due to Injury necessarily vary very much according to the mode of injury and nature of the special case. They may result from operative injuries, legitimate or criminal; in which circumstances there may be perforation of the uterine wall with injury to the bowel, and the adhesion of the two organs with a

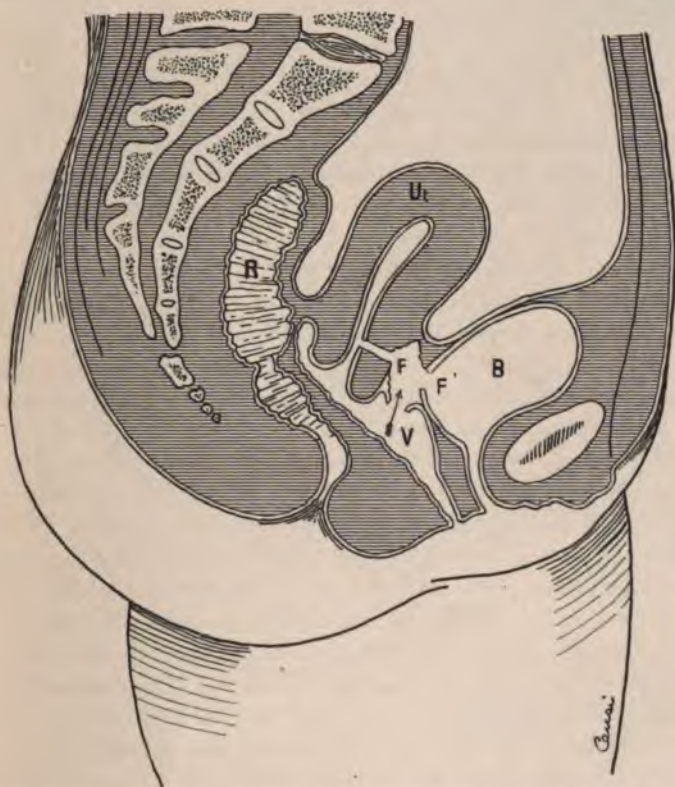


FIG. 2.—Diagram showing mode of access for the repair of utero-vesical fistule, situated in or near the cervix. Ut., uterus; R., rectum; B., bladder; V., vagina; F., opening into cervix to be closed; F', opening into bladder to be closed.

connecting fistula (Fig. 1). But more commonly the injury is produced during parturition by bruising, which is followed by sloughing of the anterior or posterior wall of the cervix, or of part of the lower uterine segment. Such an injury most commonly occurs on the anterior wall, and gives rise to a utero-vesical fistula (Fig. 1). When the injury is on the posterior wall, a utero-intestinal (rectal) fistula results.

Again, the wound of a Cæsarean section has been known to give

way and a fistula form between the abdominal wall (utero-abdominal) and the uterine cavity.

Prophylaxis is worthy of careful consideration, for skill and care in operating, especially in the manipulation of instruments within the cavity of the recently pregnant uterus, and in the prevention of too prolonged labour, may be the means of avoiding injuries which may result in fistulæ.

Utero-intestinal fistulæ.—Once the fistula is established the treatment is often a grave and difficult matter. When the large bowel is adherent to the uterus and able to discharge its septic contents into that organ, the best treatment in most cases will be to remove the uterus (when the body is infected) by abdominal hysterectomy, and to deal with the damaged bowel by a method suitable to the particular case.

If, however, the uterus is not seriously infected, the bowel should be separated from it and repaired, the hole in the uterus closed, if this is possible, and the cavity drained into the vagina. Usually, however, it will be found that the uterine wall is infected and friable, and that hysterectomy is the most satisfactory treatment so far as that organ is concerned.

Fistulæ through the abdominal wall should always be left alone for a time, to give them a chance of closing spontaneously. Should this not take place the abdomen must be opened, the uterus separated from the anterior abdominal parietes and the fistulous tract eradicated. This will probably necessitate excision of the affected area, which should be included in a long oval incision.

Utero-vesical fistulæ, the result of sloughing of the cervix, are unfortunately not very uncommon, and they are very difficult to deal with satisfactorily owing to the large amount of cicatricial tissue which is formed in the process of healing that follows an extensive sloughing. If the parts are accessible from the vagina, that is to say, if the uterus can be drawn down, the bladder should be thoroughly separated from the cervix, and the opening into it clearly defined. As a rule it will be situated in the midst of very dense scar tissue. This must, if possible, be separated from the mucous membrane of the bladder, which is closed with Lembert sutures, and the cicatrised muscle wall closed afterwards with chromic gut sutures. The final stage consists in sewing the sutured bladder surface on to the anterior aspect of the repaired cervix (Fig. 2).

If the opening between the bladder and uterus is higher up or out of reach by the vaginal route, the bladder must be separated from the uterus from above through a median sub-umbilical incision

with the patient in the Trendelenburg position. The hole in the bladder is then repaired with two layers of sutures as described above, and the hole in the uterus closed by sutures after excision of the fistulous tract. Finally the bladder is again fixed back on the anterior surface of the cervix, and the abdomen closed (Fig. 3).

Utero-ureteral fistulæ are usually found in connexion with

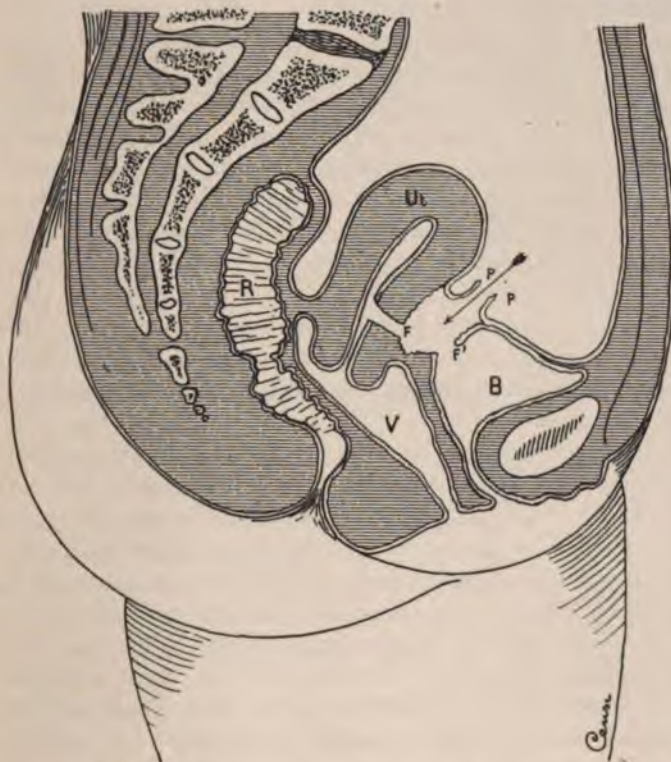


FIG. 3.—Diagram showing mode of access for the repair of utero-vesical fistulæ, situated above the cervix. Ut., uterus; R., rectum; B., bladder; V., vagina; P.P., opening through peritoneum; F., opening into uterus to be closed; F.I., opening into bladder to be closed.

vesical fistulæ following extensive sloughing of the cervix. In treating these cases it is sometimes possible to transplant the ureter into the bladder higher up, and to close the vesical opening in the manner already indicated. In other cases nothing short of removal of the kidney of the affected side will effect a satisfactory cure of the condition, for the extensive adhesions and cicatrisation of the injured parts may prevent satisfactory repair or transplantation of the ureter.

Fistulæ of the Uterus resulting from Malignant Growths indicate a very advanced stage of the disease, and are usually found in connexion with the bladder as an extension from adenocarcinomatous (more rarely squamous-celled carcinomatous) ulceration of the cervix. Sometimes the rectum behind is involved and a fistulous tract formed in connexion therewith.

The treatment of such conditions can only be palliative. No operative interference is warrantable. Great care must be taken lest the patient's miserable condition be aggravated by bedsores, which will certainly form in the sacral region, where wasting has given prominence to the bony points, unless the parts are kept dry and clean. This is no easy matter, owing to the constant dribble of urine or the passage of involuntary motions. Of the two conditions fistula into the bowel is the easier to alleviate, for opium can be given, not only for the pain caused by the cancerous invasion, but also to cause constipation, and thus prevent the continual passage of liquid fæces through the fistula. Every other day the lower bowel may be thoroughly evacuated with an enema. This will escape through the fistulous opening unless a long rectal tube is used and the patient's hips raised while the enema is being run in through a funnel.

If the rectum should become blocked by the growth and all fæces of necessity escape through the fistula (should this be above the blockage), then left inguinal colotomy must be performed. This can easily be carried out under local anæsthesia.

With a urinary fistula nothing but the most careful nursing and attention can alleviate the condition. It is advisable for the patient to be provided with a urinary receptacle which can be fitted closely against the vulva. The neighbouring skin must be kept carefully dusted with an antiseptic powder, and should the skin over the sacrum become red it must immediately be painted with tinctura catechu and liq. plumbi subacetatis dil. in equal parts. This is washed off daily with spirit and the skin re-painted.

Fistulæ Resulting from Infective Processes.—These are usually subsequent to labour or abortion. In such circumstances the intestine becomes adherent to the uterus, and when a localised abscess forms in the uterine wall a utero-intestinal fistula may follow.

The treatment, should the patient recover from such severe infective processes, consists in separating the adherent bowel, and excising the perforated portion if closure of the hole is impracticable. The fistulous tract in the uterus should be excised and closed, or the uterus removed if the lesion is extensive.

W. BLAIR BELL.

FLEXIONS AND DISPLACEMENTS OF THE UTERUS.

In many and varied affections both of its own substance and of the organs and tissues in its immediate neighbourhood, the uterus becomes altered in shape and position. A fibromyoma at the fundus may turn the uterus backwards or forwards in the pelvis, or an interstitial tumour in one wall of the organ may cause bending of the other wall. Blood poured out into Douglas's pouch pushes the uterus forwards; adhesions following the absorption of the blood drag the organ backwards. Cellulitis, salpingitis, tumours of the ovary, all tend to displace the uterus, and to fix it more or less rigidly in its altered position. In such cases the recognition of the position and relations of the uterus affords valuable evidence of the nature of the gross lesion present, but the deformity or displacement calls for no special treatment.

In another large group of cases the alteration in shape and position of the uterus is the outstanding factor, while gross lesions are absent; here it is customary to consider the flexion or version of the uterus as a morbid entity requiring special methods for its relief. The most important displacements from this point of view are the versions and flexions, forwards and backwards, and prolapse, and it is with these special groups of cases that we have here to deal.

ANTEVERSION.

The normal position of the uterus is one of anteversion, together with a certain degree of ante flexion. Pathological anteversion is defined by Schultze as a condition in which the forward displacement is more than normally "stable"; the organ is straight and its flexibility in the neighbourhood of the internal os is destroyed. The uterus is large, heavy, and stiff, while the pelvic connective tissues which form its main supports are sufficiently lax to allow the cervix to rise upwards and backwards as the fundus falls forward. The most common causes of such a condition are sub-involution, especially after abortion, and certain forms of chronic so-called metritis.

The treatment of these cases of forward displacement is that of

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the accompanying and causing condition (*q.v.*); the employment of any form of pessary is useless and frequently harmful.

ANTEFLEXION.

Congenital or Juvenile.—The uterus is normally anteflexed to a certain degree, but it is not uncommon to find on bi-manual examination that the organ is so much bent that the anterior wall of the body forms with that of the cervix a right angle, or even less than a right angle. The bend is usually at or near the level of the internal os, but not uncommonly is lower down in the cervix itself. The organ is generally thinner, more slender than usual, and in a large proportion of such cases the cervix is small and conical, its anterior wall short, and its external os pointing in the direction of the axis of the vagina. This form of acute anteflexion with small conical cervix is usually called congenital, but a better term would be juvenile. The condition is due to failure of the growth and development that usually take place in the few years succeeding puberty, the cervix as a consequence retaining the shape that is normal at the end of childhood, and the whole uterus remaining relatively thin-walled and small.

In a large proportion of cases juvenile anteflexion does not give rise to symptoms, and there is no indication for special treatment. In many cases of severe and incapacitating dysmenorrhœa, acute anteflexion is the only abnormal pelvic condition. In another group of cases not uncommonly met with, the chief complaint is sterility, and no cause other than acute anteflexion can be discovered. Under these circumstances the anteflexion calls for treatment.

Intra-vaginal pessaries are useless in the treatment of anteflexion. Intra-uterine stem pessaries have been found efficacious, but are very dangerous, and have justly fallen into disrepute. In dysmenorrhœa that has proved refractory to treatment on ordinary medical lines, and where the pain is so severe as to call for local examination, surgical treatment is indicated when anteflexion is the only abnormal condition present. In these cases, and in those of sterility due to the same cause, the best treatment consists in uterine *dilatation*, with or without division of the cervix. The dilatation is always painful and should be thorough. It should therefore be carried out under an anæsthetic and followed by a sufficient rest in bed. The most efficacious method consists in preliminary dilatation by a laminaria tent followed by the use of Hegar's dilators. The procedure is as follows:

After a careful preliminary cleansing the patient is placed in

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Sims's position, the cervix, exposed by a Sims's speculum, is seized and held by a volsellum; the uterus is measured and straightened by the sound, or, better, by a few of the smaller numbers of Duncan's or Hegar's dilators; a laminaria tent $2\frac{1}{2}$ inches long and from 6 to 8 millimètres in thickness is passed so far that not more than $\frac{1}{2}$ inch is left projecting through the external os; the vagina is loosely packed with iodoform gauze to protect its posterior wall from the projecting end of the tent. A suppository or hypodermic injection of morphine is necessary, as the tent usually gives rise to more or less severe pain for two or three hours; vomiting may also occur. The introduction of the tent should be followed in not more than twelve hours by dilatation by Hegar's dilators in the usual manner under chloroform. The preliminary use of the tent sets up a considerable discharge of mucus, and causes the tissues to be softer and more yielding, and thus greatly facilitates the subsequent full dilatation. After the introduction of No. 14 or 16 Hegar's dilator, the cavity of the uterus is wiped out with Churchill's tincture of iodine on a Playfair's probe, and is packed with iodoform gauze ribbon, which is removed at the end of twenty-four hours.

In many of these cases *division of the cervix* is advantageous. The external os is usually small, and it is not rare to find the cervical cavity dilated and fusiform, and apparently finding some difficulty in getting rid of its mucous secretion. Some operators prefer to divide the cervix on each side, but division of the posterior wall in the middle line appears to be equally serviceable, and is simpler to carry out. The little operation is done at the same time as the dilatation. The cervix is drawn down and the posterior wall divided by scissors in the middle line for a distance of $\frac{1}{2}$ to $\frac{3}{4}$ inch; one or two catgut sutures on either side serve to stop the bleeding from the cut surfaces, and at the same time to double in the raw surfaces.

The after-treatment consists in keeping the patient in bed for six or seven days, and administering an antiseptic vaginal douche once or twice a day.

As regards the outlook after operation, in the majority of cases the dysmenorrhœa is greatly or even entirely relieved, often permanently. Sometimes the pain returns after some months or years, and a renewed dilatation with or without anæsthesia is again often successful. In sterility there are obvious reasons why the chances of success are less, but in not a few cases conception follows the operation within a very few months.

Acquired Antelexion is due most commonly to causes outside the uterus itself, especially to chronic inflammatory affections of the

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appendages. Schultze believed that in many cases the cause was posterior parametritis, followed by contraction of the folds of Douglas; but it seems certain that in the great majority of these cases the parametritis is subsidiary to an intra-peritoneal affection of the appendages and broad ligaments. Other conditions occasionally give rise to ante flexion, such as, for instance, the resolution of a hæmatocele, adhesions in front of the uterus, subinvolution and metritis, and tumours of the uterus or in its neighbourhood. The treatment in all cases is that of the condition giving rise to the ante flexion, and the uterine deformity itself demands no special attention.

RETROVERSION.

Retroversion is a transitory displacement, gradually passing over either into normal anteversion or into retroflexion or prolapse. The retroverted uterus is enlarged, its consistence harder than usual, its supporting structures lax and yielding. These conditions are found co-existing in the few weeks following delivery, especially at full term, and at this time retroversion is frequent. When backward displacement is known to have existed previously, or when it now occurs for the first time, the puerperium offers the most favourable opportunity for effective treatment; neglect at this time will certainly lead to the displacement becoming permanent, and probably to its attaining a more advanced degree.

The indications for treatment are to restore tone to the supporting structures of the uterus, and to relieve them as far as possible from strain. The latter object tends to be achieved by forbidding the patient to do anything that will greatly increase intra-abdominal pressure, such as the hard work of washing, mangling, and the like, or lifting or carrying weights, as, for instance, the baby. The clothing should be so arranged that nothing tight presses on the upper part of the abdomen, and heavy articles of dress must be supported from the shoulders rather than from the waist. Strict attention must be given to the regular and easy evacuation of the bowels; and any other condition leading to strain, such as coughing, calls for careful treatment. In the early days after delivery the woman should be encouraged to lie on one or other side, so that the uterus may gravitate higher in the abdomen; after getting about again, she should be made to lie down in the horizontal position for an hour or so once or twice a day. The temporary use of a well-adapted pessary is sometimes useful in helping to relieve the supporting structures from strain. For this purpose Hodge's form or one of its modifications is the best, and the pessary must

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be so fitted as not to stretch the vaginal walls. As involution proceeds, and the vagina gets gradually braced up, one or more smaller-sized pessaries are successively introduced.

The other and more important indication is by appropriate general and local means to promote involution of the uterus and of its supporting structures, the pelvic floor and the pelvic connective tissues. The constitutional treatment demands attention to ordinary hygienic rules; the judicious combination of rest in a horizontal posture with a reasonable amount of regular and gentle exercise, especially walking, in the fresh air; and a sufficiency of nourishing food and sound sleep. As medicinal treatment general tonics are useful, such as the vegetable bitters with acids or alkalies; or when the patient is anæmic a mixture containing one of the preparations of iron. Ergot and hydrastis appear to have some effect in promoting involution, not only of the uterus, but also of its supporting tissues.

Massage of the uterus and its surroundings has been recommended, but has never come into favour in this country. General massage is useful in improving the general tone and strength of the patient, and thus exerting a favourable influence indirectly on the pelvic organs. Graduated exercises of the muscles of the abdomen, back and lower limbs may be ordered to be carried out by the patient, partly while standing and partly while lying on the back. Such exercises favourably affect the muscular tone and blood supply of the pelvic organs, including the uterus and its supports.

Locally, in the earlier stages the use once or twice a day of a copious hot douche is of conspicuous advantage. At least 5 to 6 pints of water at a temperature of 115° to 120° F. should be used on each occasion, the injection being made slowly while the patient lies on the back. One of the milder antiseptics—Condy's fluid, boracic acid, lysol, or the like—or an astringent, such as alum or sulphate or chloride of zinc, should be added to the douche water. Plain water should not be used, because it softens the superficial layers of the vaginal and cervical epithelium, and tends to keep up any condition of catarrh and any discharge that may be present. The hot injections should not be continued over long periods, but should be replaced after a week or two by astringent douches at about the temperature of the body, which may be persevered with indefinitely. The use of vaginal injections is specially indicated when abnormal discharge complicates the uterine displacement.

When the vagina continues lax and secreting, painting its walls with tincture of iodine twice or thrice a week for a few weeks is

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often useful. In doing this care must be taken to prevent the solution running downwards on to the vulvar surface, where it causes pain and smarting.

Medicated *wool tampons* are the most serviceable local method of treatment at our disposal, and their use is frequently followed by very marked improvement in the displacement, at least so long as the supporting tissues of the uterus are capable of being improved by treatment. The tampon is made by taking a piece of absorbent cotton-wool about the size and thickness of the hand, rolling it up to form a cylinder about 3 inches in length by $\frac{3}{4}$ inch in diameter, and tying a string round the middle for the purpose of withdrawal. The wool should be saturated with the desired application and the surplus moisture thoroughly squeezed out. Of the fluids employed, glycerine is the most useful, but other medicaments, especially astringents, may be added, such as alum (1 drachm to 1 oz. of glycerine), or tannic acid (1 drachm), or vinum opii (1 to 3 drachms to 1 oz. of glycerine). The tampon may be prepared by the patient herself, and should be introduced by her every morning before getting up, to be removed either at bedtime or before introducing the next one. The size should be varied to suit the particular case, or more than one tampon may frequently be introduced with advantage. This method of treatment is beneficial in several ways. The glycerine acts by withdrawing moisture from the tissues, and so tending to brace them up; and agents may be added with a view to increasing this tonic or astringent action. In all cases in which a pessary would be applicable, the wool plugs will support the uterus in position equally well. Last, and by no means least, the tampons have the advantage over pessaries of being more cleanly and of tending to improve the condition for which they are employed.

RETROFLEXION.

In certain cases of retroflexion the consistence of the uterus is soft and yielding, so that the shape and position of the organ vary from time to time, retroflexion being observed at one examination and antelexion at another. The supporting structures often show lessened elasticity, allowing the organ to subside into the position of cadaveric retroversion when the woman lies on the back. The uterus passes into retroversion as the bladder becomes full, and regains its normal forward position much less readily than usual, possibly not until after a night's rest in bed. In such cases the indication is to employ general and local treatment on the lines

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above described for retroversion. Special attention to the general health of the patient is necessary, and the most important measures include plenty of nourishing food and fresh air, and general roborant methods of treatment, physical and mental.

A large class of patients, especially single and nulliparous women, suffer from the most varied symptoms affecting the whole organism, and especially the nervous and digestive systems. These women are usually victims of the storm and stress of civilised life, of the struggle for existence under modern social conditions. Frequently a careful search for physical signs discloses the existence of a retroflexion, either alone or in company with some other inconspicuous organic abnormality. Many of the patients are markedly neurasthenic; some show signs of hysteria, such as anæsthesia of the soft palate and pharynx, exaggerated tendon reflexes, and contraction of the fields of vision. Symptoms referable to the uterus or its appendages may be entirely absent; or there may be pains in the sacral region, hips, lower abdomen and thighs, dysmenorrhœa, menorrhagia, or leucorrhœal discharges. In patients of this class, where local symptoms are absent or relatively slight, the uterine retroflexion is best disregarded at least until treatment on ordinary medical lines has been given a patient trial and has failed. It cannot be denied that occasionally treatment of the displacement is successful, sometimes to a surprising extent, in relieving or curing the general condition; but in a larger number of patients the knowledge of the abnormality and the adoption of local treatment fix the attention of the woman on her pelvic organs, and lead her to imagine that these are affected by serious disease, with deplorable results to her mental and moral health.

When there are definite pelvic symptoms in the presence of a retroflexion, local treatment is required in addition to the general therapeutic measures suggested by the constitutional and reflex symptoms that may be complained of. In practice, cases of backward displacement fall into three groups, which may be labelled Primary, Puerperal or Post-partum, and Fixed. In the first two classes the uterus is movable, the puerperal cases outnumbering the primary in the proportion of about four to one. The primary cases are those found in women who have never been pregnant, and who apply for the relief of dysmenorrhœa or menorrhagia, or in the case of married women for advice concerning sterility. This last symptom is often relieved by reposition of the uterus, followed by the insertion of a pessary. The puerperal class concerns women who have had one or more pregnancies ending in abortion or delivery at term; in many of these the retroflexion is no doubt

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merely the return of a displacement that existed before pregnancy. In fixed backward displacements the uterus may be held directly by adhesions binding its fundus or posterior surface to the peritoneum in Douglas's pouch or in the hollow of the sacrum, or it may be tethered indirectly by adherent and matted appendages. Such affections are properly classified under the term pelvic peritonitis, but they are conveniently considered along with the movable displacements because in many instances the diagnosis only becomes evident during the first step in the treatment of the displacement.

Backward displacements are frequently complicated by other conditions, as, for instance, endometritis, laceration and eversion of the cervix, rupture of the perineum. In all such cases the complication calls for treatment as well as the displacement, and when an operation is required for such a complication the opportunity should be embraced of relieving the retroflexion by a well-planned operation at the same time.

The methods of treatment of backward displacements may be considered under two headings: mechanical and surgical. The mechanical treatment comprises two steps: the return of the uterus to its normal position, and the employment of means, usually some kind of pessary, to retain it there.

Reposition.—The first step in the treatment at the same time completes the diagnosis of the presence of, and the variety of, the backward displacement. The methods of reposition are by bimanual manipulation, by the aid of a volsellum, or by the use of the uterine sound.

(1) *Bimanual Manipulation.*—The patient is placed in the dorsal position, with the head slightly raised and the knees drawn up and separated. The first two fingers of the right hand are then introduced in the vagina and pressed into the posterior fornix, and an attempt is made to push upwards the uterine fundus by sweeping the fingers gently but firmly from side to side. When the fundus has been pressed upwards as far as possible, the fingers are shifted to the front of the cervix, and press this downwards and backwards towards the hollow of the sacrum, and then upwards. The left hand now comes into play: it is pressed inwards in the hypogastrium about 4 inches above the pubes, and an attempt is made to insinuate its border between the sacral promontory and the fundus and posterior wall of the uterus. As the fundus passes the promontory and brim of the pelvis the patient usually complains of pain, and it is necessary for success that the manœuvre should be made as gently as possible so as not to set up contraction of the

abdominal muscles. If the external hand can be placed on the posterior surface of the uterus, reposition is completed easily by bringing the body downwards and forwards towards the pubes, at the same time as the cervix is pressed upwards and backwards by the internal fingers.

(2) *Reposition by the Volsellum*.—The cervix is caught by a volsellum and is drawn downwards towards the vulva in the direction of the axis of the vagina. This is intended to release the body of the uterus from contact with the hollow of the sacrum and from the embrace of the utero-sacral folds. Two fingers are then passed into the vagina and the body of the uterus is pushed forwards and upwards as far as possible; sometimes a finger *per rectum* can be used with greater advantage for this purpose. The volsellum is next employed to push the cervix downwards and backwards, and then upwards along the hollow of the sacrum, in the endeavour to cause the uterus to rotate round a transverse axis at the level of the isthmus.

(3) *Reposition by the Sound*.—This is a method not devoid of risk. The sound must be used gently and never until after a careful bimanual examination has been made. The patient is best placed in the left lateral position. The sound is passed with its concavity backwards. The *tour de maître* is then made, the handle of the sound being carried through a large circle, so as to make the intra-uterine portion rotate on its own axis. The handle is then gently carried backwards so as to cause the intra-uterine portion to bring the body of the uterus forward. When this has been done as far as possible two fingers are placed on the front of the cervix, and as the sound is withdrawn press the cervix upwards in the direction of the promontory of the sacrum as far as it will go. At the same time an attempt is made to get the external hand on the posterior wall of the uterus, and press this downwards towards the pubes.

Difficulties in Reposition.—A full bladder or rectum will render reposition difficult or impossible. The patient should therefore always be prepared by an aperient and enema, and the bladder should be emptied naturally or by the catheter before making the attempt to return the uterus into position. Where the ostium vaginae is narrow, so that one finger only can be used, reposition is often impossible; the difficulty may be overcome by rectal manipulation, but as a rule an anæsthetic will be necessary. The presence of tenderness of the uterus and of its neighbouring structures forms a contra-indication to any effort at reposition. An attempt should be made to subdue the tenderness by a few days' rest in bed with soothing treatment. When the body of the uterus

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is enlarged and not easily movable, similar previous rest is indicated; after a few days the swelling of the uterus is often found to have subsided, and the uterus to be easily returned. This is often well seen in the form of so-called *acute retroflexion*, which is sometimes in the non-pregnant condition due to strain or over-exertion, or to a fall, causing the body of the uterus to be driven down into Douglas's pouch, and held there by the tension of the utero-sacral folds. In such circumstances rapid venous congestion ensues and leads to strangulation of the body of the organ, with much pain and difficulty in reposition. A few days' rest in bed with the use of gentle aperients enables reposition to be easily effected.

The presence of adhesions usually becomes manifest in the attempt at bimanual reposition, the adhesions being present in the form of cord-like bands, broad membranes, or dense hard exudations, binding the posterior wall or fundus of the uterus to the peritoneum in Douglas's pouch or in the hollow of the sacrum. The exact relations and character of the adhesions are better made out by the aid of rectal examination, by which method more direct and easy access is gained. When hard exudations are present, no attempt at reposition should be made. When the adhesions are soft and not very numerous or extensive, it is sometimes possible to break them down and return the uterus into its normal position by bimanual manipulation.

In difficult cases the use of an anæsthetic is necessary to enable reposition to be made, but an anæsthetic should never be administered until a careful examination has been made without it. Anæsthesia conceals some of the important physical signs, such as, for instance, excessive or widespread tenderness. In such a case, or when there is swelling of the uterus, it is best to order the patient a few days' rest in bed, and to give aperients and enemata. A renewed attempt at reposition may then be made; if this fails, an examination under chloroform should follow.

Mechanical Treatment by Pessaries. — When the uterus has been returned it occasionally remains in position, but in the great majority of cases it falls back again, unless some means are taken to support it. For this purpose a variety of pessaries has been devised. The most useful is Hodge's pessary, or some of its modifications; occasionally, however, Schultze's figure-of-eight pessary or the soft rubber ring may be employed. Hodge's instrument is best made of vulcanite, and is manufactured in a variety of sizes, from which a selection can be made to fit most cases that are suitable for pessary treatment. The pessary is oblong, with rounded corners, and has a sigmoid curve on the flat,

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the upper part with a concavity forward to receive the cervix, and the lower end with the convexity forwards corresponding to the forward bulging of the lower part of the vagina caused by the levator ani muscles. The Hodge's pessary is introduced in two stages: in the first, half or three-fourths of the pessary is passed through the vulvar orifice into the vagina, and in the second, the posterior end or limb is carried backwards over the end of the cervix into the posterior fornix. With the patient on the left side or on the back, with the knees drawn up, the labia majora are well separated by the fingers of the left hand; the pessary, firmly held in the right hand, is passed with its transverse diameter corresponding to the vertical slit of the vaginal orifice, but a little obliquely, so that its upper or anterior side just misses the urethra; care must be taken to press well backwards over the perineal body and away from the vestibular part of the vulva, which is exquisitely sensitive. As soon as half the pessary has been passed into the vagina the first step is ended. The forefinger of the right hand is now passed into the vagina behind the anterior limb of the pessary until the tip of the finger rests on the upper aspect of the posterior limb; by pressing this backwards and upwards it can be made to glide over the end of the cervix into the position it is to occupy. The relative size of the pessary should now be tested; it should be an easy fit and should not stretch the vagina in any direction; in a properly fitting pessary the lower end can be pushed upwards behind the pubes for about $\frac{1}{2}$ inch. The patient should then be made to walk about a little and to strain. If the pessary is a suitable one, she will not be conscious of its presence.

After the pessary has been introduced for the first time the patient should come up for examination in a week, or earlier if there is any discomfort; afterwards every two months. The daily use of a cleansing douche of warm borax and soda lotion or lysol solution may be recommended. It is impossible to lay down any average time during which a pessary for backward displacement may be required; in most cases where its use is indicated it has to be worn for at least one and a half to two years, and often for a longer term.

When it is thought that the retroflexion will not recur the pessary may be taken out, and the patient directed to come up for examination every other day for two or three occasions. If the uterus then retains its natural position it may be left out, instructions being given that on the recurrence of pain or discomfort in the pelvis the patient should at once come up again to have the pessary reintroduced.

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In many cases modifications of Hodge's form of pessary are found advantageous. The oval form named after Albert Smith, with the larger end in the upper part of the vagina, is often useful, and less frequently Thomas's form, in which the upper concavity is much exaggerated and the upper limb thickened; in the latter form the lower curve must also be increased to prevent pressure on the urethra.

In certain cases where a suitable Hodge's pessary cannot be found, Schultze's figure-of-eight pessary may be moulded to fit the vagina. Rings of celluloid with a core of copper wire are obtainable in various sizes, of which the medium and large sizes are most generally useful. A ring of proper size is selected and softened in boiling water; it is then bent into the form of a figure-of-eight, with the two rings of a size that seems indicated by the conditions of the case; the ring intended for the upper end having to receive the end of the cervix is made smaller; a sigmoid curve on the flat is given similar to that of a Hodge's pessary, the upper end being concave forwards and the lower convex forwards. After the necessary shape has been imparted to the pessary it is hardened by immersion in cold water, and is then introduced in the same manner as a Hodge's pessary, care being taken that the end of the cervix projects into the upper ring. The disadvantage of this pessary is that the crossing of the two limbs makes a rather sharp pressure downwards on the sacrum or rectum, and may cause pain or even a pressure sore on the vaginal wall.

Occasionally, after a backward displacement has been successfully returned, marked tenderness of the structures about the posterior fornix is present, and none of the usual pessaries can be worn; in such a case the use of a rubber-ring pessary is sometimes recommended, and may be worn with comfort. Tampon treatment is much better, and may be continued until a Hodge's pessary can be fitted.

Mode of Action. - Pessaries retain a retroflexed uterus in position either by stretching the posterior vaginal fornix upwards and backwards, or by directly holding the cervix in the upper part of the vagina. No good can be done by pressure directly on the posterior surface of the uterine body. Hodge's pessary elongates the whole anterior vaginal wall, and by the tension of the posterior fornix draws the cervix upwards and backwards. This action represents the power applied at the end of a lever, of which the fulcrum is formed by a transverse axis passing through the isthmus of the uterus, and the weight is the uterine body which has to be turned forwards; the whole uterus is the lever. When the posterior

vaginal fornix is lax, the greater curve and long posterior limb of Thomas's pessary sometimes succeed in keeping the cervix up when the ordinary Hodge's form fails. In Schultze's figure-of-eight pessary the upper smaller ring is intended to receive the end of the cervix so as to hold it directly in the upper part of the vagina, while the lower larger part of the eight stretches both longitudinally and transversely the anterior vaginal wall below the cervical insertion. This form of pessary has the advantage of not stretching the posterior vaginal fornix, which has thus a chance of regaining its tone and diminishing in size.

Surgical Treatment.—*General Indications.*—In unmarried women in whom the local symptoms of a backward displacement call for treatment, operation should be preferred to the use of a pessary. In other cases where after patient trial a pessary cannot be found that will keep up the displacement, operation is necessary. Patients who have worn a pessary for a year or more with relief of symptoms, and in whom the removal of the pessary is followed by return of the retroversion with its attendant symptoms, may be offered the alternative of operation. Where adhesions are present that are not easily separated by bimanual manipulation under chloroform, it is better that an operation should be done in order that the adhesions may be dealt with by the aid of sight at the same time that the displacement is remedied. Surgical measures are contra-indicated in patients who are the subject of serious organic or general disease.

Operations for backward displacements must be simple and, as far as possible, free from danger. The new position and relations of the uterus must resemble the normal as closely as may be, and the method must not entail new dangers, as, for instance, of strangulation of intestine by bands. When there are adhesions, the method of operation must afford an opportunity of dealing directly with them and with any complications in the appendages that may be present. Finally, the reproductive functions must not be interfered with; an operation should be chosen that will allow pregnancy and labour to occur without danger. Three classes of operation have been devised for dealing with backward displacements, and in each class modifications in great variety have been suggested. No one method suffices for dealing with all cases.

(1) *Alexander's Operation of Shortening the Round Ligaments.*—**INDICATIONS.**—The operation of shortening the round ligaments is the best for mobile backward displacements in women of child-bearing age. In retroversion and prolapse with elongation of the vaginal portion of the cervix, this operation or vaginal vesico-fixation

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needs to be conjoined with amputation of a portion of the cervix. In prolapse accompanied by retroversion Alexander's operation is not more efficient than some form of vaginal or ventral fixation, which in these cases is more convenient and easy to be performed.

OPERATION.—After the preliminary cleansing and a careful bimanual examination under the anæsthetic, it is advantageous when the uterus is enlarged, or when there is a history of excessive losses, to begin by dilating and curetting the uterus. The uterus is then brought into anteversion, and a Hodge's pessary fitted, to be removed after six weeks, when cicatrisation is firm.

The patient is then placed horizontally on the back, the operator standing on the same side as the ligament with which he is about to deal, and changing over to the opposite side for the other ligament; or both ligaments may be quite easily dealt with from the same side of the body. The pubic spine can be readily felt, and taking this as a guide a 2 to 3 inch incision, the length varying with the amount of subcutaneous fat, is made from the spine outwards and upwards parallel with and $\frac{1}{2}$ inch above Poupart's ligament. The incision is carried down through the superficial and deep layers of the subcutaneous fascia to the aponeurosis of the external oblique, which is recognised by its white, shining, pearly appearance. The external inguinal ring is now seen with the transversely coursing inter-columnar fibres over it. The external oblique aponeurosis is divided for $1\frac{1}{2}$ inches, the cut beginning at the external ring, and running parallel to Poupart's ligament. The contents of the inguinal canal are thus laid bare, and a fair-sized nerve, the ilio-inguinal, is observed running inwards at about the lower border of the internal oblique muscle. The round ligament is then sought at the lowest posterior part of the inguinal canal, beneath the lower borders of the internal oblique and transversalis muscles, and by a little blunt dissection can as a rule be easily recognised as a round, shining white cord, which varies greatly in thickness and strength in different subjects. When the cord is identified it is gently pulled upwards and inwards through the internal ring, into which presently a small adherent sacculation of peritoneum, the processus vaginalis (Nuck's diverticulum), is pulled. This can be readily stripped off as far as necessary by the handle of the scalpel or by a compress. At this stage it is advantageous to cover up the wound temporarily and expose the other round ligament in the same way. When both ligaments have been found, a gentle pull upon them causes the fundus uteri to come into contact with the abdominal wall, and the

required degree of shortening of each round ligament can thus be decided upon. The ligament is then united to the fascia by a series of interrupted sutures, the spare end being cut away after ligature. The fascial incision is brought together by interrupted catgut sutures, and the skin is united by silkworm-gut sutures. Some operators employ in addition two or three deep silkworm-gut sutures, passed so as to bring together the skin, superficial fascia and oblique fascia. The wounds are dressed by a layer of gauze covered by a good-sized compress of cotton-wool, and a double spica bandage exerts elastic pressure on the incisions.

DIFFICULTIES.—It is sometimes difficult to find the round ligaments, and bands of the voluntary muscles or cords of fascia may be confused with the ligament. This difficulty may be overcome by carefully raising the contents of the canal from below up, and by gently teasing out the contents with two pairs of dissecting forceps. Occasionally the ligament is so thin and weak that it breaks even on the gentlest efforts to pull it up out of the inguinal canal. In such a case the alternative is to open the abdomen, which can readily be done through a transverse incision joining the lateral incisions, when the uterus can be fixed abdominally in the usual way.

RISKS.—There is a distinct risk of suppuration, which appears to have been more commonly observed in the operator's early cases. The proximity of the pubes and of the folds of the groin, and the ease with which secondary infection can take place, no doubt account for this. Healing by granulation delays union, and renders the development of a subsequent hernia more probable. Hernia can best be prevented by carefully uniting the fascia and by strict asepsis, so as to procure primary union. The mortality of the operation is extremely small, the risk being very little more than that of the administration of an anæsthetic.

RESULT.—The result as regards the correction of a backward displacement is excellent. On the constitutional, nervous and other symptoms which affect the patient the result is less satisfactory, much depending upon the type of patient in whom the displacement occurs. In neurotic, highly strung women, the curative effect on the general condition is frequently *nil*. On the other hand, in women who have been reduced to a profound state of neurasthenia by the continued pains and aches arising from the displacement, the cure of this by operation sometimes occurs like a charm. If the patient subsequently conceives, there is no undue risk of premature termination of the pregnancy and no increased risk during labour. As a rule the uterus retains its normal position after involution

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has taken place, but sometimes a relapse of the backward displacement occurs.

(2) *Vaginal Fixation of the Uterus*.—INDICATIONS.—There are two distinct methods of vaginal fixation. In one, vaginal fixation properly so called, the uterus is sutured directly to the wall of the vagina, where it forms strong fibrous adhesions; the result is excellent as regards the cure of backward displacement, but if pregnancy subsequently occurs grave accidents are common, and a fatal termination not rare. This method of fixation should therefore never be employed in women before the menopause. In the other variety of fixation, which may be called vaginal vesico-fixation, the body of the uterus is sutured to the peritoneum covering the bladder; the resulting adhesions are partly sero-serous, and partly between the anterior uterine wall and the loose connective tissue surrounding the bladder. In backward displacement this variety of operation does not give quite as good plastic results as the other, but a subsequent pregnancy is not attended by undue risk. In the class of case for which this method is suitable, Alexander's operation is to be preferred. In adherent retroflexion and in cases complicated by affections of the appendages, some form of abdominal fixation is better.

OPERATION.—The initial stages are the same whichever method of fixation is to be done. Two assistants are desirable besides the anæsthetist. The patient undergoes the usual preparation for vaginal coeliotomy, and is placed in the lithotomy position. The vulva is held open by lateral retractors. The cervix is seized by a volsellum and pulled well downwards and backwards. A median longitudinal incision is made through the muco-muscular wall of the vagina from a little below the urethral swelling to the insertion into the cervix; a transverse cut $1\frac{1}{2}$ inches in length across the junction of the anterior vaginal wall with the cervix makes the incision T-shaped. The vaginal wall is undermined on the two sides, and the bladder pushed upwards by finger-pressure or by the blunt end of scissors working close against the wall of the uterus.

The separation is continued until the vesico-uterine fold of peritoneum is recognised and opened by the scissors. The two forefingers are then introduced through the opening in the peritoneum and separated forcibly so as to push the bladder wall, and with it the attached ureters, off the front of the broad ligaments.

The bladder is pulled up out of the way by an anterior retractor, and the anterior uterine wall is seized by a volsellum in the middle line as high as can be seen; the body of the uterus is drawn down into the incision, the cervix being at the same time pushed back

as far as possible into the vagina. If it is now desired to inspect the appendages, the uterus can be delivered through the vaginal incision by pulling upon the anterior surface by volsella at successively higher points. After the inspection has been made the uterus is returned into the pelvis and a point in the middle line of the anterior wall about $\frac{1}{2}$ inch below the fundus is seized, so as to fix the organ for the sutures which are now to be introduced.

In vaginal fixation proper the sutures take a good hold of the uterus and bring this into apposition with the vaginal wall; the first suture is placed near the lower or vulvar end and penetrates the vaginal wall $\frac{1}{3}$ inch from the cut edge; it is then made to take a good hold of the uterine wall a little above the fixing volsellum, and is brought through the vaginal wall on the other side of the incision at the same level. Two or three other sutures are passed in the same way from side to side, and then all the sutures are tied. A few points of vaginal suture finally bring the rest of the incision together. For the fixation sutures silkworm gut is best, but if the operation is a stage in the operative treatment of prolapse absorbable material should be used, so that subsequent removal may not endanger the success of plastic operations on the perineum and posterior vaginal wall.

In vesico-fixation the uterus is held for suturing in the same way; the loosely attached vesical peritoneum is caught in forceps and drawn well down, and three sutures are introduced, one above the volsellum in the middle line, and one on each side of the volsellum. Each suture takes a good hold of the peritoneum and of the corresponding part of the anterior uterine wall, and all are introduced before any is tied. For these sutures catgut or fine silk may be used. The vaginal incision is then brought together by catgut sutures, and if the anterior vaginal wall is short it is a good plan to bring the transverse part of the incision together also in the middle line, so as to elongate the wall and allow the cervix to take a position further back in the vagina.

DIFFICULTIES AND RISKS.—In careful hands the mortality is less than 1 per cent. Occasionally difficulty may be experienced in recognising the vesico-uterine pouch, the membranous layers of the recto-vesical fascia causing confusion, especially in prolapse of long standing where there is much chronic œdematous swelling of the tissues. In the same cases there is sometimes a tendency to break into the substance of the uterus instead of keeping strictly on its surface. Rarely the wall of the bladder is so firmly united to the front of the uterus as to be in danger of being wounded. There is occasionally, but not often, troublesome hæmorrhage; this can be

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easily controlled by ligature or by over-casting sutures. In performing the operation care is necessary never to lose sight of the point of the knife or needle; neglect of this rule may lead to injury to the intestine or to the gut being sutured *in situ*.

(3) *Abdominal Fixation*.—Numerous modifications of this operation, many trivial, some fundamental, have been described. All of them fall into one of three classes. In the first of these the anterior wall of the uterus is sutured to the parietal peritoneum, so that sero-serous adhesions are formed; this may be called ventro-suspension. In the second class the anterior wall of the uterus is sutured to the connective tissue or fascia of the abdominal wall; ventral fixation properly so-called. In the third class the round ligaments are shortened intra-peritoneally.

Ventro-suspension, as usually described, is a bad operation. Some portion of the anterior wall or fundus of the uterus is attached to the abdominal wall by adhesions which become drawn out to form a band more or less thick. Below the band is a hole between uterus and bladder through which intestine may slip and become strangulated, a danger to life that is probably greater than that due to the condition for which the operation is performed. If this method is chosen, care must therefore be taken to obtain a continuous adhesion from the bottom of the utero-vesical pouch upwards to the level deemed desirable. The sero-serous adhesions do not interfere with subsequent pregnancy and labour, while the results as regards the recurrence of retroversion are good.

The sero-fibrous adhesions in ventral fixation are little likely to allow the recurrence of retroversion, but they retain their firm hold during pregnancy, and in a large number of instances have given rise to grave danger during delivery, Cæsarean section having been called for on many occasions. The danger of internal strangulation applies also to this method unless care is taken to obliterate the utero-vesical pouch. The method is not suitable for women before the menopause, but in cases of prolapse with retroversion in older women it is preferred by many operators to vaginal fixation.

The intra-peritoneal shortening of the round ligaments is carried out in divers ways. Some operators pucker each ligament by suture, others form a loop on each ligament, which is then sutured to its fellow and to the front of the uterus; others bring the loops through openings in the corresponding broad ligaments and suture them together and to the posterior surface of the uterus. In another modification of the operation the loops of round ligaments are brought through holes in the peritoneum, transversalis fascia, and recti muscles to be secured to the muscle sheath by suture.

This method results in the formation of three rings, through which strangulation of intestine may occur, and this accident has already happened in several instances; the method should therefore be abandoned. The first-mentioned ways of shortening the round ligaments give good plastic results, and are unobjectionable in women of child-bearing age.

INDICATIONS.—In any operation for backward displacement complicated by adhesions or by affections of the uterine appendages, the abdomen should be opened so that these may be dealt with by the aid of sight, and then the uterine fixation should be carried out by one of the methods above enumerated. In prolapse with retroversion some method of fixation is indicated in addition to the proceeding necessary for repairing the pelvic floor. In such cases occurring in women of child-bearing age, the choice lies between Alexander's operation, vaginal vesico-fixation, and the abdominal method of shortening the round ligaments; the method chosen depends very much on the predilections of the operator. In women beyond the menopause the choice usually lies between vaginal fixation or its modification called vesico-vaginal interposition of the uterus, and abdominal fixation with sero-fibrous adhesions. Each of these operations gives good results as regards the cure of backward displacements; but one of the vaginal methods seems preferable on the score of convenience, as the rest of the necessary proceedings are carried out by the vaginal route.

OPERATION.—The patient is prepared in the usual manner for a laparotomy. Two assistants are required, one to administer the anæsthetic and the other to assist the operator. In the Trendelenberg position the abdomen is opened by a 3-inch incision in the middle line, beginning about 1 inch above the pubes, or by a supra-pubic transverse fascial incision. The uterus and appendages are then carefully examined, and any adhesions that may be present are divided so that the uterus can be brought forward easily into its natural position. Any affections of the ovaries or tubes are dealt with as may appear desirable. The next step is to fix the uterus by the method chosen. In ventro-suspension a point in the middle line of the anterior uterine wall $\frac{1}{2}$ to $\frac{3}{4}$ inch below the fundus is seized by a volsellum, and on either side a suture is passed through the transversalis fascia and peritoneum, is made to take a good hold in the uterine wall, and is finally brought out through the peritoneum and transversalis fascia. Below these sutures the utero-vesical pouch must be obliterated for the width of $\frac{1}{2}$ to 1 inch in the middle line, so that no orifice may be left below the point of suspension. In ventro-fixation proper the edges of the wound in

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the parietal peritoneum may be sutured round an area of the anterior uterine wall $\frac{3}{4}$ to 1 inch in diameter, so as to bring the peritoneal coat of the uterus into contact with the sub-peritoneal connective tissues. In this way sero-fibrous union is secured. The utero-vesical pouch should be obliterated below the attached area in the same way as described in the last method.

If the round ligaments are to be shortened, each is caught up by forceps at about $1\frac{1}{2}$ inches from the uterine cornu, and a suture is passed so as to bring these points together in the middle line in front of the uterus; each loop of round ligament thus formed is secured by two sutures to the front of the uterine body about $\frac{3}{4}$ inch below the fundus. The utero-vesical pouch may be obliterated at the same time by bringing up the loose peritoneum covering the bladder and suturing it across the front of the uterus immediately above the line of sutures fixing the round ligaments. Another method is to take up each round ligament by a ligature passed at about $1\frac{1}{2}$ inches from the uterine cornu and to draw it back through the corresponding broad ligament. A spot free from blood-vessels is chosen in the broad ligament below the ovarian ligament and near to the side of the uterus, and a forceps thrust through at this point seizes the ligature and pulls the round ligament back through the hole. The round ligaments are then sutured together in the middle line behind the uterus, and each loop is attached to the posterior wall of the organ by two points of suture. Both these methods of shortening the round ligaments are effective in the treatment of backward displacement, and safe in women of child-bearing age. The best material for the buried fixing sutures is chromicised catgut or fine silk. After the uterus has been fixed the incision in the abdominal wall is sutured in the usual manner, special care being taken to bring the peritoneum accurately together so as to diminish the risk of undesirable adhesions.

PROLAPSE OF THE UTERUS AND VAGINA.

Preventive Treatment.—The treatment of prolapse may be considered under the three divisions of prevention, palliation, and cure.

Preventive treatment includes the proper management of labour and the lying-in period. Labour must be conducted on correct principles, so as to reduce as far as possible stretching and tearing of the structures composing the pelvic floor and vaginal outlet. Lacerations of the vagina and perineum require immediate suturing, and all possible care must be taken to ensure aseptic union, even of the smallest breaches of surface. In the days following labour

attention should be paid to the regular and easy evacuation of the bowels and to the proper emptying of the bladder, while the patient should be encouraged to lie on the side at least part of the time, and the head of the bed should be raised so as to facilitate the escape of lochial discharges. In the latter stages of the puerperium the means already described for the treatment of retroversion are indicated for the purpose of promoting involution and restoring tone to the uterus and its supporting structures, and of relieving them from necessary strain.

In some cases a well-adapted pessary is useful, those usually employed for the purpose being the vulcanite Hodge and the rubber ring. Of these the Hodge is by far less objectionable when it can be made to suit the case. In the early stage of prolapse care must be taken that the vagina is not stretched by the pessary, so as to prevent involution, and, when possible, a smaller pessary should be introduced as the condition improves. The ring pessary, as commonly used in the treatment of prolapse, is one of the most baneful methods of treatment recognised in gynæcology. A pessary that is fairly tightly must be introduced, and this tends further to stretch the lax vagina. After a time a larger ring has to be introduced, and so on. The porous rubber harbours putrefying secretions and sets up vaginitis with offensive purulent discharge, this tending further to relax the already damaged supports of the uterus. The result of such treatment is to hurry the prolapse from an early to the later stages. The treatment by medicated wool tampons is applicable to all cases where the rubber ring might be employed, but, as already pointed out, it possesses many advantages.

In every patient known to have a prolapse, the opportunity of an early birth or abortion should be taken to carry out a vigorous course of treatment on the lines above indicated, with a view to restoring the prolapse at least as far as the stage to which it had already advanced before conception took place. If the condition is neglected on these occasions it becomes more marked each time, and finally the prolapse may become complete.

Mechanical Treatment.—This includes the reduction of the prolapse, and the fitting of some form of mechanical appliance, in the worst cases a pessary, to retain the uterus and vagina in their normal positions, or at least inside the pelvis.

Reduction is generally easy, the orifice of the pelvic outlet having not been stretched in proportion to the degree and duration of the prolapse. Difficulty may be caused by adhesions of the uterus or ovaries in the sac of the prolapse, or by enlargement of the uterus due to chronic œdema and fibrous hypertrophy in old and

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grossly neglected cases, or very occasionally by the presence of a tumour. In any case of difficulty, or when severe pain is caused by the attempt at reduction, the patient should be put to bed for a few days, the bowels well cleared out, and repeated warm bathings made of the prolapsed parts; a renewed attempt at reduction then as a rule easily succeeds. The knee-chest position is often useful, and should be employed during the attempt at reduction in any case of unusual difficulty.

Retention by Pessaries.—Innumerable varieties of pessaries have been devised to keep up the extruded parts in a confirmed case of utero-vaginal prolapse. The instruments have been made of soft indiarubber, solid, or hollow and filled with air, glycerine or other elastic fluid; of guttapercha, vulcanite, or celluloid; of metals, such as aluminium or flexible pure tin; of glass or porcelain; and of boxwood, ivory, bone or wax. Of these materials the most generally useful are vulcanite and celluloid, the most objectionable indiarubber and guttapercha. According to their mode of action the pessaries for prolapse may be divided into vaginal, vaginal with stems, and vaginal stem pessaries with external support; to these may be added the perineal pad, also supported by straps to a band round the waist. The vaginal group of pessaries for prolapse falls into two divisions, according as the instruments are intended to act by largely dilating the vagina or by taking a seat on the pelvic floor. In the latter group are included the Hodge's pessary and its modifications, Schultze's figure-of-eight and sledge pessaries, and the many varieties of ring pessary. These all demand for their successful employment that the pelvic floor and outlet are not too much damaged and stretched, that the narrowest part of the vagina is its lower orifice, and that the tissues have preserved their contractility. In the most successful cases the uterus is held in anteversion, the mode of action being the same as that already described for retroflexion, to which reference may be made. In some cases of retroversion with cystocele an oval pessary has been recommended, curved on the flat with the concavity upwards, somewhat like a Hodge's pessary with the lower end turned upwards, so as to project upwards behind the pubes and support the anterior vaginal wall with the base of the bladder. Most of the pessaries in the class under discussion aim merely at keeping the prolapsed tissues within the pelvis; the many varieties of ring and some oval forms with the long axis intended to lie transversely on the pelvic floor have this action, the uterus lying often in retroversion and the upper part of the vaginal wall being doubled down on the instrument. In the same way act the vaginal stem pessaries,

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among which may be mentioned the disc-and-stem pessary of Matthews Duncan, Simpson's shelf, and Zwancke's winged pessary; of these the last should be relegated to the museum, and the others, if used at all, should be made of vulcanite with thick and well-rounded borders. The stem is intended to keep the pessary from wandering to the side or upper part of the vagina. Another class of vaginal pessary, now properly discarded, was intended to stretch the vagina, so as to keep the parts within the pelvis by its very size; among such instruments were to be found egg-shaped and spherical pessaries made of boxwood or vulcanite, and hollow rubber balls into which air could be pumped after their introduction into the vagina.

In advanced cases of prolapse unsuited for operation because of the age or decrepitude of the patient, or of the presence of organic visceral or general disease, as well as in cases where operation is refused and where the condition of the pelvic floor and vaginal outlet does not permit the use of a simple vaginal pessary, some modification of Cutter's cup-and-stem pessary with external support is necessary. The intra-vaginal portion of these instruments is composed of a cylindrical stem, carrying at its upper end a cup or a ring or loop varying in diameter from $1\frac{1}{2}$ to 3 inches. The stem is attached by one posterior strap, or better by two anterior and two posterior straps, to a waist-band. This instrument is effectual in keeping up prolapse, but is uncomfortable and chafing in use; the principal disadvantage is that it is apt to jar the viscera on any sudden movement or active exertion. Attempts to reduce the jarring have been made by modifying the materials of which the apparatus is constructed; the vaginal stem is sometimes made of soft rubber, which is however apt to bend and allow the prolapse to slip past it; probably the best method is to have the external straps made of rubber instead of tape. The use of this form of pessary demands great attention to cleanliness on the part of the patient; it should be removed and thoroughly scrubbed in soap and water every day, and the external genitals must also be kept scrupulously clean.

In a certain considerable class of cases of what may be called dilatable pelvic floor no operative treatment is likely to be successful. In such a case when the patient strains, the whole of the tissues closing the pelvic outlet are seen to bulge equally and considerably. As the bulging proceeds the vulvar orifice becomes opened, and first the anterior wall of the vagina and then the cervix are driven down into the orifice. Plastic operations on the pelvic floor itself are futile in such instances, and equally useless are operations with a

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view to hanging up the uterus by ventral fixation, shortening the round ligaments, and the like. No vaginal pessary will be retained, and the only effective means of support is by an external perineal pad fixed by straps to a waist-belt, or by a cup or stem pessary supported in like manner. An endeavour should be made to brace up the supporting tissues by general means, including nourishing food, fresh air, and tonics, and locally by stimulating douches, cold or lukewarm hip baths followed by rough towelling, and the practice of graduated leg exercises suited to strengthen the muscular constituents of the pelvic floor.

DISADVANTAGES AND DANGERS OF PESSARY TREATMENT.—A pessary is a foreign body and apt to do harm. A patient wearing one should be warned of its risks, should be instructed to be more than usually careful in the toilet of the genital organs, especially after the menstrual periods, and should be directed to attend at regular stated intervals of two or three months for careful examination of the pessary and the vagina. Instruments of soft rubber or gutta-percha may be depended upon to set up a putrid vaginitis, especially in married women, and the discharges not seldom become acrid and irritating to the vulva as well as intensely fœtid, resembling those seen in the last stages of uterine cancer. Badly fitting pessaries give rise to pressure sores, most frequently in the anterior vaginal wall, where it is compressed against the pubes, and in the posterior fornix; pain and a blood-stained discharge result, and the patient should be warned to come up for examination without delay on the appearance of either of these symptoms. Incarceration of pessaries, and the more serious effects of pressure and neglect, are now much less common than they were a few years ago. In 1893 Neugebauer published a collection of 242 such cases; in many ulceration of the vagina had occurred, leading to pelvic cellulitis or peritonitis, to perforation of the rectum or bladder or both, or even to fistula of the ureter or urethra; death ensued in eight cases. By far the greatest number of these cases were observed at the climacteric and in old women; in many the pessary had been neglected for years, but in some it had only been in the vagina for a few weeks or days.

The evil results depend on the wrong use, the wrong size or shape of the pessary, or the unsuitable material of which it is made. Hard smooth vulcanite appears to be the least objectionable material, and Zwaneke's pessary the most dangerous form.

Surgical Treatment.—When prolapse has become established, surgical treatment is indicated in the great majority of instances. The operations that have been devised may be divided into two classes, according as they are intended to improve the pelvic floor

or to hold up the uterus and fix it in anteversion. No attempt will be made to enumerate all the methods that have been devised, but a description will be given of those which have been tried and found useful by the writer. One of the most difficult problems is to fit the appropriate operation or series of operations to the individual case. In *cystocele*, anterior colporrhaphy and posterior colpo-perineorrhaphy are indicated. In a large group of cases cystocele is found associated with elongation of the supra-vaginal cervix and retroversion of the uterus; here vaginal or ventral fixation of the uterus is indicated together with anterior colporrhaphy, amputation of the cervix, posterior colporrhaphy and perineorrhaphy; these operations may conveniently be done in the order mentioned, and may quite well be carried out at one sitting. *Rectocele* is a special form of prolapse of the posterior wall of the vagina due to hernia of the wall of the rectum through a defect in the recto-vaginal septum; for its relief a well-executed posterior colpo-perineorrhaphy is required. In prolapse following retroversion, posterior colpo-perineorrhaphy must be combined with a fixation or with shortening of the round ligaments. In the less common group of cases where retroversion and prolapse have followed upon primary elongation of the vaginal cervix, amputation of the cervix needs to be combined with shortening of the round ligaments or fixation. In certain severe cases of old-standing prolapse in women beyond the climacteric, the operation called intra-vaginal fixation or vesico-vaginal interposition of the uterus, combined with an extensive posterior colporrhaphy, is often of conspicuous service.

In any operation for prolapse where the patient is complaining of menorrhagia, it is desirable to curette the uterus as the first step in the operation.

Vaginal Hysterectomy.—Vaginal hysterectomy has many times been proposed and carried out as an operation for prolapse, an instance of the employment of words confusing an issue. It is customary and perhaps convenient to speak of prolapse of the uterus, but it must not be forgotten that the uterus is only a portion of the structures which come down. Prolapse is properly likened to a hernia, of which the neck is situated at the level of the triangular ligament; the sac is partly formed by the cervix, and the contents include the body of the uterus. It is obvious that vaginal hysterectomy only removes a small portion of the sac and part of the contents of the hernia, and therefore cannot be considered a radical operation; it is sometimes indicated in old-standing prolapse complicated by the presence of tumours in the uterus or its appendages, or by pyosalpinx; but it requires to be

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supplemented by an efficient operation on the pelvic floor and outlet.

In a certain number of cases total excision of the vagina, together with the removal of the uterus, has been performed, and this is certainly a radical proceeding. The operation is, however, a dangerous one, especially in old women in whom alone it comes into consideration.

Anterior Colporrhaphy.—The patient is placed in the lithotomy position, the cervix is drawn down by volsella, the urethral swelling is held up by a volsellum, and the anterior vaginal wall is made taut. An oval flap with its long diameter in the long axis of the vaginal wall is marked out by the scalpel, which is carried through the thickness of the vaginal wall. The size of the flap varies with the amount of stretching of the anterior wall; it should not be so broad as to interfere with the suturing of the wound made in the posterior colporrhaphy that usually follows; an average size would be about $2\frac{1}{2}$ to 3 inches by 1 to $1\frac{1}{2}$ inches. The edges of the flap are caught in forceps and by traction with the help of a few strokes of scalpel or scissors the flap is removed. Bleeding is generally small in amount, two or three bleeding points only requiring to be secured.

The bladder wall is now inverted by two or three purse-string sutures, by a continuous suture, or by one or two layers of interrupted or figure-of-eight sutures. The cut edges of the vagina are brought together in the middle line, and the operation is complete. The best material for the sutures is catgut, which does not require removal, with the consequent risk of damaging the perineorrhaphy that is usually performed at the same time.

Posterior Colpo-perineorrhaphy.—With a finger of each hand the orifice of the vagina is pulled widely open so as to show the attachments of the lateral vaginal walls to the pubic rami. At this level a point on the posterior vaginal wall is seized on either side by a volsellum about $\frac{3}{4}$ inch below the firm lateral attachment. These two points must not be too far apart so that when they are brought together in the middle line the vagina will still be sufficiently capacious. A third point is seized high up in the middle line of the posterior vaginal wall, a little below the level of the cervix. Incisions forming two sides of a triangle are now made one on each side from the upper median point to the lower lateral one. The flap thus marked out is caught up by its edges in pressure forceps and stripped downwards by traction aided by the division of fibres here and there; usually one or two spurting arteries require to be ligatured. The cut edges of the vagina are brought

together in the middle line by catgut sutures, the middle volsellum being then removed.

Next, a point is seized by a volsellum on the inner surface of each labium majus at about the level of the posterior end of the nympha. These points represent the anterior level to which the newly formed perineum will extend, and they must be selected so that the new perineum may extend well forward to support the urethra and the whole of the anterior vaginal wall, while at the same time the orifice of the vagina must be left sufficiently wide to admit two fingers. An incision on either side is now carried from the volsellum at the level of the pubic arch to the volsellum on the corresponding labium. The external ends of these two incisions are finally joined by an incision along the inner side of the labium majus and over the perineum. The making of this cut is facilitated by fixing the perineum by a volsellum and making taut the skin between this and the laterally placed volsella. A large three- or five-sided area has thus been marked out, of which the upper apical portion has already been removed and the cut edges united. The rest of the flap is now removed and the vaginal wall sutured in the middle line as far as the orifice of the vulva. A deep conical wound is now left between the vaginal wall and the perineum, and at the sides of this wound are found the stretched and separated fascia and muscles of the pelvic floor. A series of buried catgut sutures, each taking a good hold of the tissues, approximate the fascia and the levators in the middle line. On the placing of these sutures chiefly depends the final result of the operation; if they are well placed the result is a large triangular body of tissue in the middle line closely resembling a well-formed perineal body; if they are omitted the result is usually a thin membranous perineum.

Finally, the skin of the perineum is brought together in the middle line by a series of interrupted sutures of silkworm gut or silver wire. For the buried sutures and for the vaginal portion of the incision catgut is the best material. Sutures cannot afterwards be removed from the vagina without endangering the result of the perineal operation.

Amputation of the Cervix.—In cases of prolapse where the cervix is large and thick lipped, especially when there is eversion or erosion with profuse discharge, a wedge-shaped excision of the two lips of the vaginal cervix is indicated. In primary elongation of the vaginal cervix, the most common cause of prolapse in single and nulliparous women, a similar amputation is required, leaving the vaginal cervix $\frac{1}{2}$ inch or thereabouts in length, and reducing

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the total length of the uterine cavity to about the normal average, $2\frac{1}{2}$ inches. In the so-called hypertrophic elongation of the supra-vaginal cervix, supra-vaginal amputation is required as one of the steps in an operation for the radical cure of prolapse. In this case the operation conveniently follows the incisions for anterior colporrhaphy and the operation for vaginal fixation.

WEDGE-SHAPED EXCISION.—The patient is placed in the lithotomy position, the cervix drawn down, and the length of the cavity is measured by the sound. The wall of the cervix is split by scissors or scalpel on either side nearly to the level of the vaginal insertion. The anterior lip is removed by a wedge-shaped incision, leaving a V-shaped transverse furrow, the sides of which are brought into apposition by sutures passed antero-posteriorly. These sutures may be left long so as to serve for lowering the uterus while the posterior lip is amputated and sutured in similar fashion.

Supra-vaginal amputation of the cervix has been described in detail elsewhere.

The various methods of uterine fixation, abdominal and vaginal, have been described already under the treatment of backward displacements. One special form of vaginal fixation is specially adapted for cases of utero-vaginal prolapse in older women, and calls for separate brief description.

Vesico-vaginal Interposition of the Uterus.—This operation, devised by the Vienna school, forms a notable addition to the resources of surgery in dealing with severe cases of prolapse in women beyond the menopause; it forms a further development of the operation of vaginal fixation, and requires to be associated with an extensive posterior colpo-perineorrhaphy. For the proceeding to be successful the uterus must not be in a state of advanced senile atrophy, neither must it be too much enlarged and lengthened by hypertrophy. The organ becomes in a sense a living pessary, and for its effective action the pelvic floor must be made good. When relapse has taken place after this operation has been performed, the fundus has usually remained fixed and the cervix has descended; occasionally, however, the fundus has been the first part to come down.

With the patient in the lithotomy position, the anterior wall of the vagina is divided in the middle line, as in the operation for vaginal fixation, and the wall on either side undermined bluntly over as large an area as may appear necessary. The bladder is separated from the anterior wall of the cervix in the usual manner, and pushed up until the vesico-uterine fold of peritoneum is reached. This is opened and the uterus drawn out

through the hole thus made. The peritoneum covering the bladder is then sutured to the back of the uterus at the level of the isthmus and to the insertion of the utero-sacral folds. The flaps of vaginal wall may be partly resected, enough being left to cover in the anterior surface of the uterus; they are then sutured together in the middle line, the uterus thus being fixed with its posterior surface under the bladder, to which it forms a support. If the vaginal flaps are too small to cover in the uterus completely, it is a matter of no consequence as the peritoneal surface soon becomes covered with stratified squamous epithelium.

Results of Operation for Prolapse.—The danger to life is small; probably a fraction of 1 per cent. represents the mortality in the hands of competent surgeons. The remote results are also very good; in a considerable number of collections of cases the results have been followed out, and from these it appears that a complete and permanent cure has been obtained in proportions varying from 75 to about 90 per cent. of the cases operated upon. The best results have been obtained by combining an efficient method of fixation of the uterus with an extensive repair of the pelvic floor.

In women of child-bearing age the operator has to select his methods with special care. As Döderlein points out, the surgeon is on the horns of a dilemma in operating upon the pelvic floor; if he does not remove sufficient tissue the prolapse is very likely to return; if he removes too much tissue, and the patient subsequently becomes pregnant, labour is obstructed and a more or less severe operation, even Cæsarean section, may be required. A return of the displacement follows in a considerable proportion of the cases in which pregnancy and labour supervene.

CHRONIC INVERSION OF THE UTERUS.

The treatment of this condition calls for separate consideration, according as the condition follows upon puerperal inversion or as it is caused by the presence of intra-uterine tumours. In **chronic puerperal inversion** many of the methods that have been devised have deservedly been abandoned. Among these are the various methods of attempted reduction by taxis, whether aided or not by fingers in the rectum or bladder; and the method of dilatation of the cup of the inversion by a glove-stretcher after laparotomy.

The main obstacle to reduction is a tonic contraction of the fibromuscular ring of the cervix in incomplete, and of the upper part of the vagina and cervix in complete, inversion. The two practical

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methods of overcoming this resistance are by continued elastic pressure and by surgical operation.

Continued Elastic Pressure is best carried out by repositors resembling the cup-and-stem pessary, and the best form is Galabin's modification of Aveling's original model, the cup being formed in the end of a cylinder $1\frac{3}{4}$ inches long, having its diameter equal to the transverse diameter of the cup.

METHOD OF APPLICATION.—The patient should be kept in bed for a few days, during which careful attention is given to the diet and to clearing out the bowels, while copious hot vaginal douches are administered twice or thrice a day, with the addition of an emollient antiseptic such as lysol. The venous congestion of the inverted uterus is thus diminished, the fibrous and muscular tissues become less resistant, and the mucous membrane is rendered healthier and cleaner. A cup is then chosen of a size suited to embrace without indenting the summit of the inversion. The stem is of sigmoid shape, with the upper concavity forward to follow the axis of the pelvis, and the lower concavity backward to carry the external portion back over the perineum. The lower end of the stem is pulled upon by four bands composed of ordinary rubber elastic rings attached by tapes to a waist-band, which is in turn supported by shoulder-straps; the pressure may be varied by using stronger rubber rings, or by increasing the number on each cord. The cup having been carefully adjusted and the elastic apparatus fitted, careful watch has to be kept lest the cup becomes shifted. The pain that is usually caused requires the use of opium or of morphia and belladonna. The pressure may have to be removed after a time, and it is sometimes useful to repeat it for a few hours on several successive days; if fever arises, the treatment must be stopped. The method of elastic pressure thus applied is usually successful, but calls for the exercise of much patience by both the woman and the medical attendant, and as a rule has to be continued for at least twenty-four to forty-eight hours.

Surgical Treatment.—The other, and in the present development of surgery preferable, form of treatment is by operation. Several methods have been devised, both by the abdominal and the vaginal route. In all of them a median longitudinal incision is made in either the anterior or posterior wall of the inverted uterus, the inversion is then reduced, and the incision of the uterus sutured. The vaginal route appears to be the better, and by it the peritoneal cavity may be entered either in front of or behind the cervix.

OPERATION.—In the operation described and practised first by

Küstner, a transverse incision of sufficient width to allow the uterus after reposition to be returned into the abdomen is made posteriorly at the junction of the cervix with the vagina. The left forefinger is then passed through the incision into the hollow of the inverted uterus, and serves as a guide for a median incision in the posterior wall, which is made from the end of the cervix half-way or thereabouts to the fundus. With the two fingers in the peritoneal cup and the thumbs on the mucous surface the inversion is reduced. The uterus is then pulled well downwards in deep retroversion, and the incision in its posterior wall carefully united by two layers of interrupted catgut sutures; the first sutures embrace the whole thickness of the uterine wall except the mucous membrane, and are placed at a distance of $\frac{1}{2}$ inch from each other; the other set of sutures take up the peritoneum and about $\frac{1}{8}$ inch in thickness of the muscular coat, and a sufficient number are introduced to bring the edges of the incision accurately into apposition. Finally, the vaginal incision is sutured, a small gauze drain being introduced into the bottom of Douglas's pouch if there is doubt as to sepsis.

The method of operation through the anterior vaginal fornix is practised in steps similar to those just described; but in closing the vaginal incision the peritoneum covering the bladder may be separately sutured across the front of the uterus above the end of the uterine incision, which is thus made intra-peritoneal; the vaginal wall is finally closed separately with or without drainage of the utero-vesical connective tissue space. The after-treatment is the same as that of vaginal fixation.

Inversion due to Tumours.—Here the treatment depends upon the nature of the tumour causing the inversion, which is usually a submucous fibroid, but sometimes is sarcomatous. In the latter case complete hysterectomy is demanded, and would probably best be carried out by the abdominal method so as to secure as free removal as possible of the malignant uterus. When inversion is due to a fibroid, removal of the tumour is indicated; in doing this care should be taken to keep close to the tumour, cutting down on to its surface at a little distance from the attachment to the uterine fundus, and enucleating the fibroid carefully so as not to penetrate the wall of the uterus and open the peritoneum. After the removal of the tumour, the uterus, as a rule, re-inverts itself in the course of a few hours or days; to encourage this process the vagina may be packed with iodoform gauze. If spontaneous re-inversion does not take place after reasonable waiting, the case must be treated in the same way as described for chronic puerperal inversion.

THOMAS WILSON.

HYPERTROPHY OF THE CERVIX.

Hypertrophy of the Vaginal Portion of the Cervix.—Hypertrophy of the vaginal portion of the cervix is most frequently a congenital condition, and is met with in virgins and in primiparæ. It may also become hypertrophied as a result of inflammation and laceration. Amputation of the vaginal portion is the treatment of the congenital form, and also of those cases of hypertrophy with laceration in which trachelorrhaphy does not promise to give a good result (Fig. 1).

The Operation of Amputation of the Vaginal Portion of the Cervix.—Place the patient in the lithotomy position, with her hips slightly overhanging the end of the table. The vulvar, perineal, anal and pubic regions are then thoroughly scrubbed with an antiseptic solution. Lysol, owing to its soapy character, is one of the best agents for this purpose, and may be used in the strength of 1 in 60. The vulvar and pubic hair is removed with a razor, and then the vagina is disinfected. This can be done by means of pledgets of cotton-wool soaked in lysol solution in the grasp of a strong pair of forceps applied vigorously to every portion of the vagina, followed by a similar application of a solution of either perchloride or biniodide of mercury (1 in 2,000).

A rapid and effective way of sterilising the vagina is first to paint it thoroughly with tincture of iodine, and then introduce cotton-wool dipped in a saturated solution of hyposulphite of soda, which removes the colouring matter.

Auvard's, or some other form of self-retaining speculum, which retracts the posterior vaginal wall and opens up the vagina, is now passed. (If the vagina is virginal and narrow, Sims's speculum will be more suitable.) Place a volsellum in the middle of the anterior lip, and another in the posterior, pass the uterine sound, and note the distance and direction which it takes. It may pass $4\frac{1}{2}$ inches, and it will show that the fundus occupies a good position in the pelvis. Pull the hypertrophied cervix down to the vulva with the volsella and split it with knife or scissors on each side nearly up to the vault of the vagina, dividing it in this manner into two halves, an anterior and a posterior. Then draw the whole cervix forwards towards the pubis and proceed to amputate. Remove the posterior half first by carrying the knife from left to right through its entire

thickness immediately below the reflection of the vaginal vault. To remove the anterior half pull it backwards towards the perineum, carry the knife from left to right through the entire thickness at a point previously ascertained by means of the bladder sound, slightly

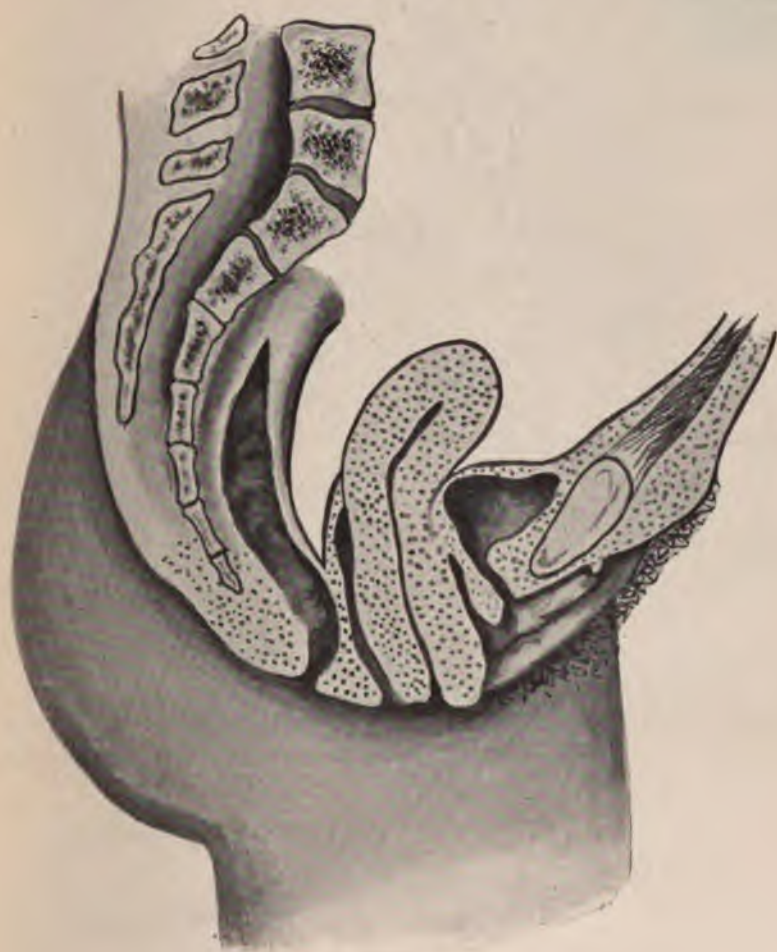


FIG. 1.—Hypertrophy of the vaginal portion of the cervix.

below the lower limit of the bladder. There may be considerable bleeding, but the vessels seldom require to be ligatured separately, as the sutures which are introduced subsequently to bring the flaps together are usually sufficient to control the hæmorrhage. Medium-sized chromicised catgut is the best material for the sutures. It is

not absorbed until firm union has taken place, and it has the great advantage of not requiring to be removed. The sutures must be placed in such a manner as to keep open the cervical canal, to

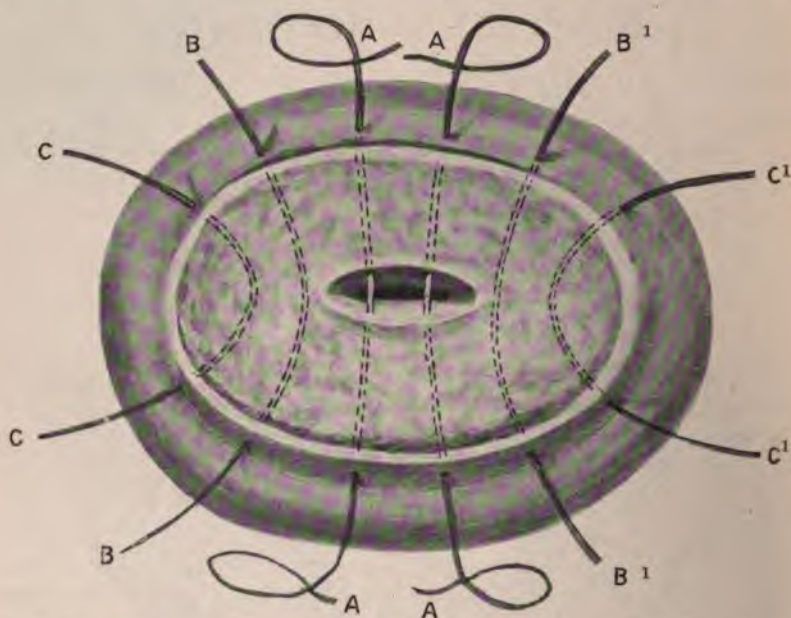


FIG. 2.—Stitches passed after amputation of the vaginal portion of the cervix.

control hæmorrhage, and to secure good apposition of the anterior and posterior vaginal flaps. To ensure patency of the cervix, the vaginal edge above and below must be fastened to the cervix so as to make the cervical and vaginal mucous membranes continuous.



FIG. 3.—A useful needle for passing cervical stitches.

Two sutures, about 18 inches long, A A (Fig. 2), are required for this purpose. Pass them through the entire thickness of the cervix in an antero-posterior direction, taking care that they traverse the cervical canal a short distance apart from each other. After they are passed seize them with hook or forceps as they cross the canal,

pull them out a short way and divide them, converting the two ligatures into four. Then pass sutures B, C, B¹, C¹. These approximate the vaginal flaps and control bleeding vessels. After all the sutures are tied the cervix presents the appearance shown in Fig. 4.

To guard against bleeding, and also to ensure the patency of the cervical canal, a good plan is to pack the cervix and upper part of the vagina with iodoform gauze, which is removed after two or three days. The patient should be kept in bed fourteen days.

Hypertrophy of the Supra-vaginal Portion of the Cervix.—Hypertrophy of the supra-vaginal portion of the cervix (Fig. 5)

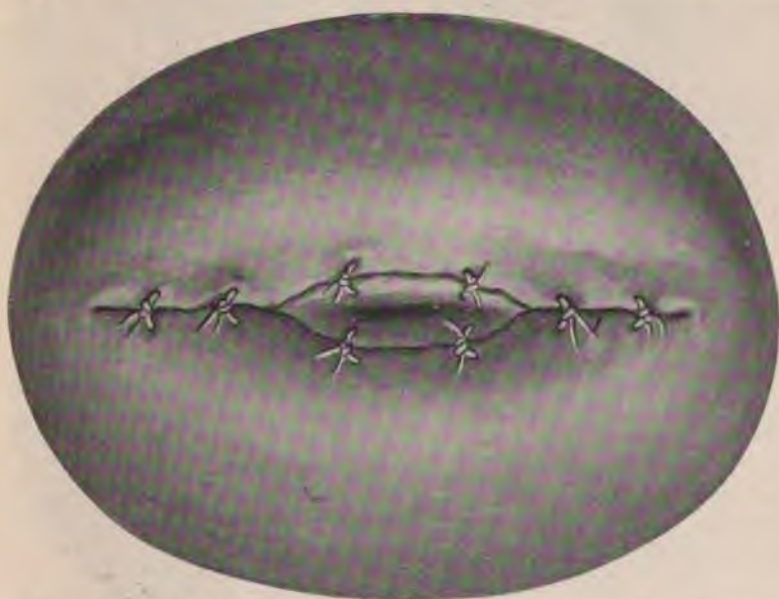


FIG. 4.—Stitches tied after amputation of the vaginal portion of the cervix.

occurs in prolapsus uteri and as a congenital condition. The elongation of this part of the cervix is accompanied by descent of the bladder and anterior vaginal wall in front and of the posterior vaginal fornix and Douglas's pouch behind. The treatment is amputation.

The Operation of Amputation of the Supra-vaginal Portion of the Cervix differs materially in detail from that just described. One may be called high and the other low amputation of the cervix. In the high operation the cervix is divided at or about the level of the internal os uteri, to accomplish which it is necessary to separate and reflect the bladder from the front of the cervix, and the

peritoneum from the posterior aspect. Should the peritoneum be opened into by mistake, the wound is closed by a catgut stitch. The circular artery of the cervix and other branches of the uterine



FIG. 5.—Hypertrophy of the supra-vaginal portion of the cervix.

artery may require to be ligatured, while the close proximity of the ureters has to be kept in mind. The operation of amputation of the cervix at the level of the internal os may be performed as follows.

The anterior vaginal wall is divided by a curved transverse

incision immediately below the bladder reflection, and a similar incision is made at the same level on the posterior aspect of the



FIG. 6.—Amputation of the supra-vaginal portion of the cervix.

cervix, the two incisions joining each other at each side. In front the anterior vaginal wall and bladder are pushed up as far as the

level of the internal os ; and, behind, the posterior vaginal wall and the peritoneum are carefully separated from the posterior surface of the cervix till the required height is reached (Fig. 6). The cervix is then cut through with scissors or knife, and the operation completed in the manner shown in Figs. 2 and 3.

N. T. BREWIS.

INJURIES OF THE UTERUS.

IN considering the treatment of injuries to the uterus we must take into account not only the causal factors, but also the position of the injury; that is to say, for the sake of clearness we must deal separately, as far as possible, with lesions of the cervix and body in regard to the manner in which they have been produced.

INJURIES OF THE CERVIX.

These may be: (1) Injuries produced during the process of parturition; (2) Injuries not associated with labour.

(1) Injuries produced during parturition have already been dealt with (*see* Lacerations of the Cervix, p. 189).

(2) Injuries to the cervix other than those produced during parturition are uncommon, but may be caused by the abortionist, or by operative procedures and by caustics. Injuries caused by the abortionist are serious, and will be considered below in connexion with injuries to the body of the uterus, with which they are usually associated.

Lacerations of the cervix may be unintentionally caused by the operator during the rapid dilatation of the cervix of the non-pregnant uterus, but the injury is more likely to occur during the rapid instrumental dilatation of the softened cervix of pregnancy. In the latter condition most operators prefer intentionally to divide the cervix along the anterior median line and to open the uterine cavity (hysterotomy), suturing the wound after the completion of the operation. Should instrumental dilatation cause lacerations of any extent, these, of course, must be sutured at the end of the operation.

Cauterisation of the cervix has in the past occasionally led to very serious sloughing of the parts, and in such circumstances the injury has been caused by leaving the cauterising agent, often silver nitrate, too long in contact with the cervix. In one case the cervix and a portion of the anterior vaginal wall were destroyed, resulting in a large vesico-vaginal fistula.

The treatment is, of course, chiefly prophylactic, but should the damage be done the case must be treated on the lines already laid down above in regard to sloughing of the cervix.

INJURIES OF THE BODY OF THE UTERUS.

The injuries most often met with are : (1) Those produced by the operator, by the abortionist or by foreign bodies ; (2) Incidental injuries from penetrating wounds or crushes ; (3) Rupture during parturition.

Injuries Caused by Operative Procedures (Legitimate or Criminal).—The uterus has not infrequently been perforated by sounds, dilators or curettes during operative procedures, especially when the organ is in the softened condition due to a recent pregnancy. As a rule no harm results, for the instruments are sterile, and the operator has recognised the state of affairs and has not proceeded further. It has been recorded, however, that the practitioner has delivered bowel with ovum forceps through a rent made in the wall of the uterus. If the uterus is infected, as is sometimes the case after an incomplete abortion, the organisms may gain access to the peritoneal cavity through the rent in the wall and set up septic peritonitis. This, too, is especially liable to happen when the laceration of the uterus has been caused by the dirty weapon of the abortionist.

The treatment of these injuries is a matter of considerable moment, and it is very necessary to have a clear conception of what has occurred, and what is likely to supervene, if we would treat them successfully. In the first place, of course, there is the question of prophylaxis. With reference to abortionists nothing need be said here ; but in regard to instrumental perforation during justifiable surgical procedures there are a few points of considerable importance. *There is no doubt that it is unwise for any but the skilled gynecologist to use anything but the gloved finger inside the recently pregnant uterus.* The practitioner may complain that it is difficult to remove fragments of placenta or membrane from the wall owing to the slippery surface of the rubber glove. But if a large thin sterilised cotton glove is carried along with the rubber glove, this can be slipped over the latter and the removal of the placenta thereby facilitated.

When an instrument or even the fingers are used to evacuate the pregnant or recently pregnant uterus, the operator must *always* grasp the fundus with the left hand, while with the right he empties the cavity or directs the instrument within it. In this way the surgeon knows exactly what he is doing, and he can control the manœuvres within the uterus by means of the hand outside.

When a perforation has been made, the question of treatment depends entirely on the probability or actual presence of sepsis. If the operation have been aseptically conducted, and the procedure is

a simple one such as curettement of the non-pregnant uterus, it will be sufficient to abandon the operation and drain the uterus for twenty-four hours with a gauze wick, and to put the patient back to bed in the Fowler (sitting) position. As a rule no evil results follow in these circumstances. Should there be evidence subsequently of peritonitis the abdomen must be immediately opened, the extent of the damage ascertained and dealt with, and drainage established. If bowel has been delivered, laparotomy must always be performed and the intestines examined; when extensively injured or when its mesentery is badly torn, it will be necessary to excise a portion of the gut. The wound in the uterus may then be sutured and the cavity drained into the vagina. If the possibility of sepsis is great, the uterus should be removed. When the uterus is known to be septic at the time of operation, the abdomen should be opened and hysterectomy performed, the patient being put back to bed in the Fowler position.

In those grave cases in which septic peritonitis is already present, usually as the result of interference by the abortionist, the abdomen should be opened at once and the lacerated organ removed and free drainage established, if the patient is able to stand such extensive procedures. Subsequently she must be kept in the Fowler position and continuous saline infusions administered into the rectum or under the breasts. When her condition is very serious, the surgeon must be content with free drainage of the pelvis and the subsequent measures already mentioned.

When the laceration of the uterine wall is due to an intra-uterine stem or some instrument maliciously inserted, the treatment will, as in the foregoing cases, be largely governed by the question of possible sepsis, and must be considered on the lines already laid down.

Incidental Injuries.—Incidental injuries to the non-gravid uterus must be extremely rare, for its position in the centre of the pelvis protects it from penetrating wounds of the abdomen, or even from crushes and fractures of the pelvis, unless those lesions are so destructive as to be inevitably lethal in their effect. But injuries to the pregnant uterus are not uncommon, whether actually incidental or purposeful, and only incidental in that while the uterus is the objective of attack the abdominal parietes must first be perforated and the abdominal cavity opened before the uterus is wounded. Such injuries, which have been not infrequently recorded, are produced by sharp instruments, stabs or falling upon spikes, by bullets, (a woman has been known to fire a bullet through the abdominal wall into her own pregnant uterus), or by the horn of an animal.

These injuries must necessarily be serious, and there can be no doubt as to the treatment. The abdomen must be opened at the earliest possible moment and the extent of the damage ascertained. Here we are only concerned with the injury to the uterus, although, of course, other injuries such as those to bladder or bowel would possibly also require attention. If the injury to the wall of the uterus were found to be superficial and the cavity not penetrated it might be possible to insert a few sutures, and to close the abdomen after ensuring drainage in case of sepsis. It is, however, hardly to be expected that such a minor degree of injury to the uterus would be likely to occur. If the organ is wounded at all, perforation may be anticipated. This involves in the majority of cases escape of the liquor amnii or injury to the placental site, both serious accidents which leave the operator no choice in regard to the termination of the pregnant condition; the only question left to him to decide is whether the uterus shall be removed or not. When the injury is extensive, there can be no doubt that the uterus ought to be removed as soon as possible. In some cases if the operation were immediately performed it might be possible to save the life of a viable and uninjured child by delivering it first by Cæsarean section.

When the perforation is only of limited extent and sepsis improbable, the uterus should be evacuated by Cæsarean section. If the child is viable so much the better, but whether or no the uterus must be emptied and the laceration in these circumstances sutured, it will be necessary to pass the finger through the cervix to ensure its dilatation, and to drain the interior of the uterus with gauze before closing the incision (which may be an extension of a perforating laceration of the anterior wall). A drain must also be carried down through the abdominal wound to the site of incision in the uterus.

All these cases should, however, be treated as though sepsis were inevitable, the patient being placed in bed in the Fowler position and treated with continuous salines on the slightest positive indication of infection. When the probability of sepsis is great, the uterus should always be removed.

Rupture of the Uterus during Parturition.—This condition has already been dealt with (*see* Rupture of the Uterus, p. 238).

W. BLAIR BELL.

MALFORMATIONS OF THE UTERUS.

As a rule malformations of the uterus do not call for active treatment, so that only those conditions which may give rise to symptoms or difficulties will be considered here.

Absence and Imperfect Development of the Uterus (rudimentary or infantile uterus).—These are conditions for which at present there are no certain prophylactic measures, although it is not improbable that in the near future the less marked varieties of under-development of the uterus will, if discovered about puberty, prove amenable to treatment based on the relation of the ductless glands to the development of the genital organs.

Many women with under-developed uteri have no subjective symptoms. There is, however, a class of case which is not infrequently seen in the consulting-room. In this the patient suffers from primary amenorrhœa with marked monthly molimina, such as pain in the back and abdomen, giddiness and vomiting, vicarious menstruation, or even epileptiform seizures. In such patients the ovaries are active, and at each menstrual epoch produce the disturbances in the general metabolism associated with that process. There is now little doubt that the discharge from the uterus is excretory, and that the suppression of the function is attended with general metabolic disturbances. Hence it is that symptoms of a marked character are apt to arise and demand relief.

The only treatment of any use is that directed towards decreasing the ovarian secretion. When the symptoms, such as epileptiform seizures, are sufficiently severe to warrant the procedure, *one* ovary should be removed. Both ovaries have been sacrificed in these circumstances, sometimes with good results, but occasionally with the supervention of melancholia. Every surgeon should display the same reluctance to remove *both* ovaries from any woman, whatever her symptoms, as he would in the removal of both testes.

Recent research holds out hope that these and similar cases will in the future be amenable to scientific treatment in the way of counterbalancing the effect of the ovarian secretion by the administration of antagonistic substances.

Abnormalities due to Failure of the Müllerian Derivatives to Fuse in the Normal Manner.—These circumstances, which lead

to a variety of malformations, may be associated with rudimentary conditions and the symptoms mentioned above. Here it will only be necessary to consider such deformities, or special circumstances associated with them, as require further treatment. The majority of cases as a rule demand no special consideration, since nothing can be done to rectify the anatomical deformity.

In completely divided conditions of the two uterine bodies, which normally fuse to form the uterus, these structures may lie side by side, and each be functional; or they may be widely separated and even be found fused with a congenital hernial sac in the inguinal or femoral region (ectopia genitalium). Again, when the uterus is bicornute and one horn long and rudimentary, the latter may be found in the sac of an inguinal hernia, but in these circumstances it is merely herniated and not fused with the sac. In either case it is common to find the tubes and ovary in the hernial sac with the corresponding uterine body.

The proper treatment of these conditions is to open the hernial sac, excise the rudimentary uterine body and the attached tube, together with the ovary on *one* side when the monthly molimina are giving rise to marked symptoms. If, however, the uterus is bicornute and the other uterine horn functional, the ovary should be returned to the abdominal cavity, and a radical cure of the hernial sac effected in the ordinary way.

Pregnancy in a bicornute uterus or in a rudimentary horn may call for serious consideration. When pregnancy can be diagnosed in a rudimentary horn, the abdomen should be opened and the parts removed at the earliest possible moment, for rupture of the rudimentary horn, which will otherwise inevitably follow, leads to all the dangers that may arise after the rupture of a tubal pregnancy. The condition, in fact, will usually be diagnosed as a ruptured tubal pregnancy, and treated accordingly. Pregnancy may, however, continue to full term in a bicornute uterus, and normal parturition occur. Sometimes labour may be difficult and the delivery of a live child impossible owing to a coincidental narrowing of the pelvis, or to the obstruction caused by the non-pregnant horn, which enlarges with the progress of pregnancy in that of the other side. The non-pregnant horn has been mistaken for a cervical fibromyoma. When the delivery of a viable child *per vias naturales* is impossible, Cæsarean section should be performed; and when the non-pregnant horn is the cause of the obstruction it should be amputated, to prevent a similar difficulty arising in a subsequent labour.

Atresia of the Cervix.—Atresia may be associated with absence

of vagina or the upper part of that passage, or it may be found in one cervix of a "double uterus"; in these circumstances the corresponding "lateral vagina" is frequently not developed. There is usually nothing to lead one to suspect the condition until the patient reaches the age of puberty. When menstruation commences the uterine discharges are, of course, retained, and give rise to increasing discomfort each month. The molimina experienced by the patient may be those of constitutional disturbance, headache, giddiness and so on; but in addition she may suffer from pain of a stretching character in the abdomen, with referred pain in the sacral region.

An examination *per vaginam*, or, in the absence of a vagina, *per rectum*, will disclose the uterus enlarged by the contained discharges (*hæmatometra*). In time the tubes also become distended with secretion (*hæmatosalpinx*).

The question of treatment is an important and not always easy matter to decide; but if we are determined to be as conservative as possible, our

difficulties and our consciences will be lightened. In women under twenty years of age, or perhaps it is better to say in those who have not had menstrual molimina for more than two or three years, and in whom the uterus is not very large¹ nor the Fallopian tubes distended, it is advisable to try to establish a patent cervical canal. If the vaginal cervix is well formed, the obstruction will be found at the internal os uteri; and these cases are the



FIG. 1.—Conical cervix with "pinhole" os externum. The cervix is under-developed. (From Blair Bell's "The Principles of Gynæcology," Longmans, Green and Co.)

simplest to treat. A large trocar is passed through the centre of the cervix into the uterine cavity, the fluid drained off, and the cervix then further dilated with Hegar's dilators, and the uterus and cervical canal packed with iodoform gauze. Subsequently the patient must be carefully watched lest the canal close; should it show a tendency to do so the whole cervix should be amputated. When there is no attempt at cervix formation, a plastic operation will be necessary. A large opening is made into the cavity of the uterus as though a cervix had been amputated, and the vaginal



FIG. 2.—Operation for conical cervix with "pinhole" os externum. First step: lateral division of the cervix. (From article by Pozzi, *Journal of Surgery, Obstetrics and Gynecology*.)

mucous membrane is detached all round and sewn as far up to the uterine cavity as possible, the canal and cavity of the uterus being afterwards packed with gauze.

In most cases, however, such treatment has been found impossible or inadvisable owing to the number of years that have elapsed from the commencement of menstruation to the time when the patient has sought advice. The tubes are probably also distended with their secretions, and the wall of the uterus has become so hypertrophied that it is extremely unlikely that it will regain the normal condition. In these circumstances the proper treatment is to remove the uterus and tubes. One or both ovaries should be left.

If the atresia is in the cervix of one-half of a uterus didelphys in which the other half is functional, it may be possible to remove the affected portion only. Similarly, when the atresia is in one cervix of a markedly bicornute uterus an attempt should be made to amputate the affected horn, leaving the functional one. But when the obstruction occurs in one cervix of a septate uterus with double cervix, it will probably be necessary to remove the whole organ.

Stenosis of Cervix, and Conical Cervix.—The "pinhole" os is a condition frequently associated with a conical cervix. The whole

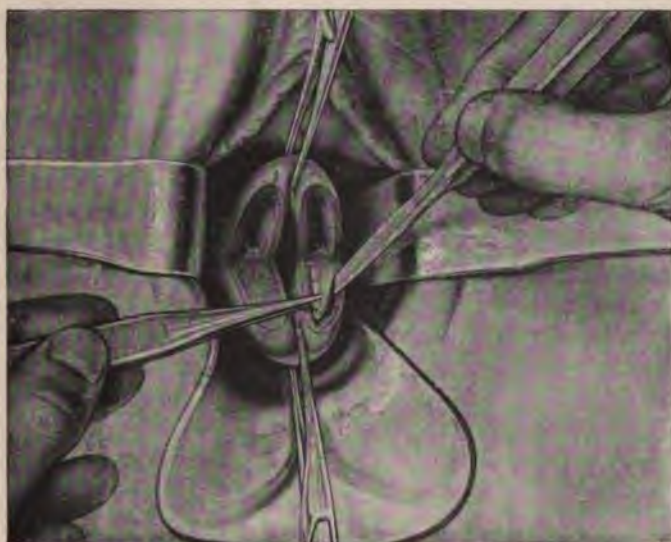


FIG. 3.—Operation for conical cervix with "pinhole" os externum. Second step: grooving the raw surfaces. (From article by Pozzi, *Journal of Surgery, Obstetrics and Gynaecology*.)

vaginal cervix may be small and under-developed (Fig. 1). The condition may be associated with a badly developed uterus, but this is by no means always the case. The patients come under notice owing to the dysmenorrhœa from which they often suffer, or because of their sterility.

Treatment is directed to the efficient correction of the deformity. Many surgeons deal with the condition by simple dilatation with Hegar's dilators, or by division of the cervix, or by a combination of the two procedures. There is, however, a tendency for the incisions to heal up and the cervix to return to its former stenosed condition. Such bad results led Pozzi to introduce recently an

operation,¹ which in his hands has given excellent results. The writer, also, has found it a very efficient method for overcoming the deformity.

To perform the operation the cervix is seized in two volsella and drawn down. The vaginal portion is then divided with scissors on either side to the vaginal attachment (Fig. 2). On the anterior and posterior portions of the divided cervix being pulled apart four raw surfaces are exposed; these are hollowed out as shown in Fig. 3, so that the mucous membrane of the cervical canal can be sutured to the vaginal surface of the cervix on each side (Fig. 4);



FIG. 4.--Operation for conical cervix with "pinhole" os externum. Third step: suturing the edges of the grooves. (From article by Pozzi, *Journal of Surgery, Obstetrics and Gynaecology*.)

in this way a wide external os, which does not become stenosed, is produced. It will be found that "40-day" chromic gut forms a better suture material than the wire shown in the illustration from the original paper.

Congenital Hypertrophy of Cervix.—This is a somewhat uncommon malformation and must necessarily be carefully distinguished from the elongated cervix seen with prolapsus uteri, associated primarily with vaginal prolapse. With congenital elongation of the cervix the vaginal vault is in the normal position, unless, of course, true prolapse is associated with this condition and the whole increase in length lies in the vaginal cervix. In some cases

this is so great that the external os may present at the orifice of the vagina.

On passing a sound into the uterus the increase in length of the whole canal is found to be in excess of the normal length of the uterus by the additional length of the congenitally hypertrophied cervix.

The treatment is simple. The whole of the vaginal cervix is amputated in the ordinary way.

W. BLAIR BELL.

REFERENCE.

- ¹ Pozzi, S., Surg. Gynæc. and Obst., Chicago, 1909, IX., p. 111.

SARCOMA OF THE UTERUS.

THE uterus is liable to many forms of sarcomatous growth, which may be classified under three heads: (1) Those resulting from sarcomatous transformation of a myoma; (2) those originating in the parenchyma of the uterine wall; and (3) those originating in the mucosa.

Operative measures alone hold out hope of cure in uterine sarcoma, but to give such measures a reasonable chance of success the nature of the tumour requires to be diagnosed as early as possible. Thus it is impossible to divorce the symptomatology of these growths from their treatment, and it is therefore necessary to briefly recall their main features.

Sarcomatous transformation of a myoma is said to have occurred in about 2 per cent. of all the cases of myomata operated on. The figure seems high, but agrees with the published reports of many operators.

It is, however, certain that the prognosis of this form of uterine sarcoma is far more favourable than that of the others mentioned. Sarcomatous transformation of a myoma is accompanied by a rapid increase in size of the tumour and increased hæmorrhage, and, sooner or later, the presence of ascites. Any uterine myoma presenting these signs requires removal at once, though all of them may be produced by non-malignant changes in the tumour.

Sarcoma of the uterine wall is less common; the tumour grows rapidly and uterine hæmorrhage is constant. Thus the signs and symptoms of carcinoma of the body or of a very rapidly growing myoma are simulated. Most of the cases occur in women between forty and fifty years of age, that is, during the period when myomata commonly begin to give rise to serious trouble. There is, therefore, a danger that the latter species of tumour may be diagnosed and operative measures delayed whilst ergot and other styptic drugs are given a trial. The fact that continuous uterine hæmorrhage is not normally associated with uterine myomata may here again be emphasised.

Sarcoma originating in the mucosa of the uterus is still more uncommon. When it does so, it assumes one of two types. More commonly it resembles a large, rapidly growing glandular polyp, from which indeed it can only be distinguished by microscopical

examination. This type is met with in young women as a rule. Very rarely it presents as a "grape-like" mass, somewhat resembling a vesicular mole. These "botryoid" sarcomata grow from the cervix and may form an enormous mass. Most of the recorded cases have occurred in young children.

The operative treatment of uterine sarcoma consists in total extirpation of the uterus and adnexa. In cases involving the cervix the full technique of the radical abdominal operation for carcinoma of the cervix had better be employed (p. 601).

Inoperable cases must be treated on the lines indicated on p. 615.

VICTOR BONNEY.

SUBINVOLUTION OF THE UTERUS.

It is necessary to have a clear understanding as to the normal processes which bring about the involution of the uterus, for the causes that are responsible for incomplete involution (subinvolution) are often dependent upon imperfect physiological as well as upon acquired pathological conditions, and a knowledge of these is essential to successful treatment. Involution, which when complete and perfect leads to the return of the uterus almost to its former size, is brought about by several physiological processes: (1) Retraction, which is the tonic recoil inherent in the stretched muscle fibres. This is assisted by (2) contractions, which normally occur in the puerperal uterus; and lastly, by (3) autolysis in the hypertrophied muscle fibres, leading to a diminution in the size of the muscle cells. Now interference with any of these natural processes may result in subinvolution.

The normal length of the cavity of the uterus in the parous woman is $2\frac{3}{4}$ inches. After delivery the cavity of the contracted uterus measures $6\frac{1}{2}$ inches; at the end of the first week of the puerperium it is about $4\frac{1}{2}$ inches, and it may return to $2\frac{3}{4}$ or 3 inches by the end of a fortnight. Sometimes the process of involution is less rapid, but in any case the uterus should be perfectly involuted by the end of six weeks. If, however, after that time it be found enlarged with an internal measurement of say, $3\frac{1}{2}$ inches, then a definite degree of subinvolution is present and treatment is necessary. This can be best discussed by considering the various causal factors, which may be either general or local.

SUBINVOLUTION DUE TO GENERAL CAUSES.

Acute Fevers and Toxæmias, whether dependent on or independent of parturition and the puerperium, are usually associated with subinvolution of the uterus. The cause is somewhat obscure, as doubtless many toxins are capable of producing inertia of the involuntary muscles. There seems, however, to be little doubt that the demands of the general metabolism on the calcium salts during acute fevers is contributory to the uterine atony, owing to the depleted state of the blood in regard to its calcium content. Subinvolution in these circumstances may in the milder degrees be

successfully treated with calcium lactate (gr. 30 *omne nocte* for one week, and then *alterna nocte* for a few weeks longer). The drug must be fresh, and be taken on an empty stomach.

Should the degree of subinvolution be great, it is advisable to administer intra-muscularly infundibular extract (1 cubic centimètre)* daily for three or four days to ensure immediate and complete contraction, and subsequently to administer the calcium lactate as described above for a further period of three or four weeks. The infective disease must at the same time be treated. It is hardly necessary to say that by way of prophylaxis the slightest possibility of infection during labour or the puerperium must be carefully guarded against by due aseptic and antiseptic precautions.

But apart from acute fevers subinvolution is seen with **chronic debilitating diseases**, such as tuberculosis, for the same reasons as those given above in regard to acute fevers; consequently the treatment is the same.

Again, there are some **women who habitually suffer from a deficiency of lime salts in the blood**. In such cases there is usually an inability on the part of the patient to suckle her child, and probably the association between the absence of milk (which contains large quantities of lime salts) in the breasts and subinvolution of the uterus is the chemical one mentioned, namely, a low calcium content in the blood. It will be found that all these cases are best treated by the administration of calcium lactate, although infundibular extract, which is so much more rapid and powerful in its effect, should be given for a few days in those cases in which the uterus is unusually large at the end of six weeks. Infundibular extract, which was recently introduced by the writer, is to be preferred to preparations of ergot, owing to the rapidity, certainty and prolonged period of its action.

SUBINVOLUTION DUE TO LOCAL CAUSES.

Retention of the Products of Conception is by far the most common and important of local causes. The symptoms consist of more or less continuous hæmorrhage, with enlargement of the uterus. The severity of the symptoms depends to some extent on the amount of the material retained; when a large piece of placenta is left in the uterus, the hæmorrhage may be so severe that treatment is demanded early after the termination of the pregnancy. Sometimes only a small piece is retained, in which case a fibrinous

* Of a 20 per cent. sterile solution prepared ready for use by Messrs. Burroughs, Wellcome & Co.

deposit occurs over the surface of it, and a placental polyp is formed. In these circumstances the symptoms may not be urgent enough to cause the woman to seek advice immediately.

The diagnosis is usually quite clear, and the treatment consists in the removal of the remains of the placenta in the manner described elsewhere in regard to incomplete abortion. After the operation a dose of infundibular extract should be given daily for a few days in order to stimulate the uterus to return to the normal size. There is rarely any acute septic infection in these cases, but sometimes a mild grade occurs and gives rise to permanent trouble in a manner to be described presently.

Acute Antelexion or Retroflexion may lead to the accumulation of uterine discharges with subsequent subinvolution. In the case of antelexion this has been seen after Cæsarean section, and probably can be prevented by dilating the cervix with the finger from above and inserting a gauze drain into the uterus for twenty-four hours.

It may also be mentioned here that, since labour has not commenced in many cases when Cæsarean section is performed, the normal post-partum chemical agents stimulating contraction may not be present in sufficient quantities, so that infundibular extract should be injected daily for a few days, and then followed by a course of calcium lactate if the uterus does not appear to be undergoing normal involution.

When there is retroflexion, in addition to the tendency for the discharges to collect in the uterus, there is mechanical interference with the venous circulation, and this of itself causes subinvolution. For this reason, and also because these cases of retroflexion are curable if treated immediately after full-term labour or abortion by replacement and the insertion of an Albert Smith pessary, all women should be examined one month after parturition to find out whether the condition of the uterus is normal.

Over-stretching of the Muscular Wall of the Uterus, such as may occur with hydramnios, vesicular mole or multiple pregnancy, may be followed by subinvolution owing to the inadequate degree of retraction from the loss of tonic recoil, just as prolonged over-stretching of a piece of rubber tends to prevent the complete return to the original length. Such cases should be carefully watched and the contractions maintained by the therapeutic measures already mentioned.

Growths in the Wall of the Uterus, such as fibromyomata, by interfering with both contraction and retraction, are always, when of any but the smallest size, followed by some degree of

subinvolution. The consideration of the treatment of such a condition falls under the treatment of the pathological condition present.

Infective Processes in the Pelvis are a frequent source of subinvolution, and they bring about the result in various ways. When there is thrombosis of the ovarian and hypogastric veins the interference with the venous circulation may be the cause, but apart from such mechanical causes toxins circulating in the blood may, as already mentioned, prevent the normal contractions of the puerperal organ.

Infection of the Uterus itself invariably leads to some degree of subinvolution, and not only is this immediately present, but it may persist and only be discovered later in the condition known as *fibrosis uteri*, which is dependent on three factors: infection, subinvolution, and fibrosis. The fibrosis is partly a sequel to infection and partly the natural course of events in women in middle life. Since, therefore, the effects of subinvolution are so far-reaching, early treatment is urgently demanded; yet this is not always possible, for the degree of infection may not have been sufficient to impress upon the practitioner the necessity of anticipating subsequent developments, unless routine post-puerperal examination is made.

In regard to subinvolution from infective processes it is hardly necessary to say anything about prophylaxis in the present day, nor of the almost criminality of putting the fingers or hand into the vagina or uterus during labour or the puerperium unless carefully purified and afterwards enclosed in a sterilised rubber glove. As a point of practical importance it may be mentioned here that some unfortunately have discarded gloves because of the difficulty of removing adherent placenta owing to the slippery surface of the rubber. This can be got over by putting on a thin cotton glove, also previously sterilised, over the rubber glove. Indeed, a cotton glove should always be carried by the accoucheur.

When sepsis is present, and this may be conveyed during labour in the immediate puerperium, or in the late puerperium (usually gonococcal), the treatment depends on the efficient local treatment of the infection, as is set out fully elsewhere.

If the patient is first seen later, when the acute illness is over, the treatment of the chronic condition of which subinvolution may be a prominent feature, even though the stage of *fibrosis uteri* is not yet reached, is a matter of great difficulty. Drugs are no longer of the same value, this value decreasing in direct proportion to the time that has elapsed since parturition. If it is some months since this occurred, it is advisable to treat the uterus by

curettement and swabbing the interior with tincture of iodine, or by electrical ionisation. It is probably better not to persist in ionisation too long, but to follow this with faradic electrical treatment to induce uterine contractions. Hot douching, if effectually carried out, is also a therapeutic measure of considerable value.

It must never be forgotten that the common condition known as *fibrosis uteri* is a frequent sequel to the train of events, sepsis and subinvolution, recounted above, so that too great trouble cannot be expended in dealing effectually with subinvolution at an early stage.

W. BLAIR BELL.

DISORDERS OF MENSTRUATION.

AMENORRHŒA AND SCANTY MENSTRUATION.

AMENORRHŒA is in many instances an unsatisfactory condition to treat successfully. The practitioner must remember that it is merely a symptom, so that the more minutely a case is investigated to discover the cause the more likely is treatment to be attended with success.

As there are many conditions which cause amenorrhœa, so treatment varies considerably. If a patient has never menstruated, and yet is several years beyond the age at which puberty is usually established, she is regarded as a case of primary amenorrhœa.

Two distinct types of primary amenorrhœa are observed. In one type (*primary permanent amenorrhœa*), the uterus and adnexa are in such a rudimentary state that menstruation can never occur, whereas in the second class (*primary temporary amenorrhœa*) the flow is late in making its appearance owing to chlorosis, mal-nutrition, or very slight under-development of the uterus and ovaries. Thus it happens that in primary amenorrhœa there is a group of cases in which treatment cannot possibly exert any influence on menstruation, and there is also another group in which the onset of menstruation can be encouraged by general and local treatment. The term *secondary amenorrhœa* is used to signify that menstruation has been established, but for some reason it is in abeyance. Finally, in the consideration of the treatment of amenorrhœa, we have to discuss the treatment of *crypto-menorrhœa* or hidden menstruation.

When a girl with primary amenorrhœa is brought to the physician for advice, he should be guided in his treatment by the age, the appearance and the general health of the patient.

Primary Temporary Amenorrhœa.—If the patient is seventeen or eighteen years of age and is not of a masculine type, and if in addition she enjoys perfect health, no treatment or examination is necessary. If, however, she suffers from chlorosis, as many of the patients do, a mixture containing iron and arsenic should be prescribed. As many of the patients are constipated, magnesium sulphate can with advantage be added to the mixture. The following prescription may prove useful: *R. Ferri Sulph., 3j; Liq.*

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Arsenici Hyd., ℥86; Magnes. Sulph., ʒvi; Acid. Sulph. Dil., ℥86; Aquæ Menth. Pip., ʒiij; Inf. Quassiæ, ad ʒvj. [U.S.P., R. Ferri Sulph., ʒj; Liq. Acid. Arsenosi, ℥86; Magnes. Sulph., ʒvi; Acid. Sulph. Dil., ℥86; Aquæ Menth. Pip. ʒiij; Inf. Quassiæ, ad ʒvj].
Sig.: Capiat, ʒss ter in die post cibos ex aqua.

Constipation must be avoided, so that the dose of magnesium sulphate in the mixture should be regulated according to the requirements of the individual. Sometimes unpleasant effects, such as nausea, severe constipation or diarrhœa, are produced by the use of iron and arsenic. This difficulty may be overcome to a great extent by using some of the modern preparations of iron and arsenic, such as Squires' ferromanglobin with arsiny. This mixture, which is a combination of iron, manganese, hæmoglobin and the organic salt of arsenic, is particularly well tolerated by the stomach.

In Bland's pill we have a convenient and reliable preparation for treating the condition, but in order to be efficient the pills must have been recently prepared. At the outset two pills should be prescribed three times in the day after food, but later three or four pills may be given each time. Nux vomica and quinine are valuable tonics, the latter drug acting also as an emmenagogue. The following mixture may be prescribed with benefit: R. Ferri et Quinin. Cit., ʒj; Tinct. Nucis Vomicae, ℥86; Glycerini, ʒjss; Aquam Chloroformi, ad ʒvj. [U.S.P., R. Ferri et Quininæ Cit., ʒj; Tinct. Nucis Vomicae, ʒjss; Glycerini, ʒiss; Aquæ Chloroformi, ʒiij; Aquam, ad ʒvj]. M. Capiat, ʒss ter in die post cibos ex aqua.

As any improvement in the general health favours the onset of menstruation, patients with anæmia should be advised to reside in the country or at the coast, where outdoor exercises should be indulged in, but the severity of such exercises should entirely depend on the condition of the patient's circulation. The benefit to be derived from the proper ventilation of dayrooms and bedrooms should also be forcibly impressed on the patient. Frequently the practitioner is questioned regarding the dangers which are supposed to ensue from bathing, but he need not hesitate to recommend a tepid bath in the morning, or even sea bathing, provided that the patient obtains a satisfactory reaction immediately afterwards. The hot baths at Wiesbaden and Carlsbad may be recommended when a patient or her friends express a desire to visit a Continental spa, but prior to sending a patient abroad on his own responsibility the physician should ascertain the condition of the internal genital organs while the patient is under the influence of a general anæsthetic. By adopting this precaution he may recognise that the organs are so rudimentary that the case will prove to

be one of primary permanent amenorrhœa, and thus he can warn the friends that no benefit is likely to result from the change.

Patients engaged in factories or warehouses frequently develop the tea-drinking habit and avoid the more wholesome articles of diet. Such errors in diet must be corrected. The meals should be small, nourishing and easily digested. Sandwiches containing finely minced raw meat may be added to the diet or the juice from the beef may be given in a little milk.

Beyond general tonic treatment no other form of treatment need be considered until we have indications that the onset of menstruation is near. This should be suspected when the patient suffers periodically from pain in her back, abdomen and thighs. The breasts feel painful and distended, while in addition mental depression or flushings may be present. Whenever these preliminary disturbances occur the patient should be ordered to take a hot hip bath, or hot fomentations may be applied to the lower abdomen and lumbar region. At the same time the patient should take 8 gr. of quinine sulphate and 2 min. of dilute hydrobromic acid in 1 oz. of chloroform water. The frequency with which the quinine is repeated depends entirely on the toleration to the drug exhibited by the patient.

Other drugs are supposed to possess special virtues in inducing the flow to appear at this time, and of these the one most commonly used is pennyroyal, although its value as an emmenagogue is doubtful. Fifteen minims of the oil may be given in hot water, to which a little gin or whisky has been added. Some physicians prefer to use 2 min. [U.S.P., $\frac{1}{4}$ min.] of tincture of cantharides, given well diluted, but this drug ought only to be employed with the greatest caution, as it is extremely liable to produce strangury. The danger and discomfort resulting from its use outweigh its value as an emmenagogue. After the appearance of the flow tonic treatment should be continued for some time, as menstruation is apt to be scanty.

If still the flow does not appear, in addition to the administration of general tonics, we should persist in treating the case with emmenagogues until the return of the symptoms which are presumably associated with the onset of menstruation. Among the various emmenagogues which may be used during the interval manganese is probably as satisfactory as any. Dioxide of manganese or potassium permanganate, in 2 or 3 gr. doses, may be prescribed in pill or capsule. Ashton suggests a useful pill which consists of 1 gr. of potassium permanganate, $\frac{1}{2}$ gr. of oxalic acid, and 2 gr. of the citrate of iron and quinine; one pill should

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be taken after each meal. Apiol is an emmenagogue favoured by many; it can be given alone or in combination with ergot; it should be prescribed in capsules which contain 5 min. of apiol, or 2 min. of apiol and 3 gr. of ergot; from one to three capsules may be given two or three times in the day. When a patient is troubled with constipation, it is questionable if we can prescribe a more useful emmenagogue than aloes. After each meal the patient may be given a pill composed of the following ingredients: Extract of Aloes, gr. 1; Dried Sulphate of Iron, gr. 2; Extract of Nux Vomica, gr. $\frac{1}{4}$.

A large number of drugs, such as guaiacum, myrrh, potassium iodide, pulsatilla, viburnum prunifoliatum and santolin have been recommended as emmenagogues suitable for use at this time, but the length of the list is suggestive of their inefficiency. When a patient's appearance is the least suggestive of deficient action on the part of the thyroid gland, she should be treated with thyroid extract without delay, or the uterus may remain in an infantile condition.

In concluding the consideration of the medical treatment of amenorrhœa it may be stated that we must depend for our results almost entirely on general tonic treatment, and in the event of failure, little benefit need be expected from the use of direct emmenagogues.

If the symptoms usually associated with the onset of menstruation recur periodically, and yet the flow does not appear, despite the treatment outlined above, the effect of local stimulation may be tried. Before *local treatment* is instituted it is essential that the practitioner should ascertain the condition of the internal genital organs. A pronounced degree of under-development or the presence of inflammatory lesions in the uterus and adnexa are contra-indications to local treatment. Dilatation and curettage is the operation which is generally performed in these cases, although some gynecologists simply introduce a sound into the uterine cavity three or four times per month.

Sometimes the insertion of a polished metal stem pessary proves useful. Prior to the introduction of the stem the length of the uterine cavity should be ascertained by means of a sound. By obtaining this measurement we are enabled to choose a stem of suitable length. If the length of instrument were to exceed that of the cavity then the patient would experience discomfort, and inflammatory changes would be apt to ensue. The stem readily slips into the uterine cavity if two or three Hegar's dilators of small size are passed into the cervical canal immediately

beforehand. In order to prevent the stem from slipping downwards a small Hodge pessary is placed in the vagina when the stem is in position. The Hodge pessary directs the fundus of the uterus forwards, so that the lower end of the stem will impinge on the posterior vaginal wall whenever the stem begins to descend. The stem pessary is a perfectly safe instrument to use, provided that asepsis is observed and the patient maintains the recumbent position while the instrument is in place. No instrument should be permitted to remain in the uterine cavity for more than a month. As regards after-treatment no douches need be given, but if the temperature becomes elevated and the pulse rate increases the stem should be withdrawn at once. Many years ago the galvanic uterine stem had many advocates, but it has fallen into disuse, as, apart from its questionable utility, it was a common experience to discover that the zinc portions of the instrument quickly became corroded, and undue chemical irritation was sometimes set up in the uterine cavity.

When Apostoli's interesting work on the electrical treatment of fibro-myomatous tumours appeared, it was natural that renewed interest would be taken in the effect of electricity on various gynecological conditions. Although the continuous current is now seldom employed in the treatment of amenorrhœa, yet its action in producing changes in the uterine body and cervix are so distinct in some cases of slight under-development, that the subject is worthy of brief consideration. In primary amenorrhœa, however, electrical treatment yields much less satisfactory results than in those cases where under-development of the uterus is accompanied by scanty menstruation and dysmenorrhœa. The current may be derived from the continuous low pressure supply used for lighting purposes or it may be obtained from batteries. The battery generally used in the consulting room is the Leclanché battery jar, but for details concerning batteries, both stationary and portable, the practitioner should consult a maker who specialises in the manufacture of electro-medical apparatus. It is essential that the rheostat for regulating the strength of the current and the galvanometer for estimating it should be thoroughly efficient, so that the patient may not be exposed to shock. A metal electrode resembling a uterine sound and insulated to within $\frac{1}{2}$ inch from the tip, is passed into the vagina until the tip enters the cervical canal. The tip, which consists of a copper cylinder, should not pass into the uterine cavity. There is a binding screw at the other end of the electrode to connect it to the wire coming from the negative pole of the battery. Five or six layers of linen from 8 to

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10 inches square, or two pieces of flannel of similar size, are next immersed in a warm saline solution and placed on the abdominal wall. If any skin abrasion is noted, it should be covered with a small piece of oiled silk, or the patient will experience pain when the current is applied. A square sheet of lead is now placed on the compress. The plate which covers about half the surface of the compress bears a connecting screw to attach it to the wire coming from the positive pole. We now instruct the patient to press the compress gently against the abdomen while we connect the binding screws to their respective wires. By means of the rheostat we allow the current gradually to increase until the galvanometer registers a current of from 50 to 70 milliampères. After an application lasting about five or seven minutes the current is gradually reduced until the rheostat offers its entire resistance, whereupon the electrode is withdrawn from the cervix and vagina. In every case shock and undue discomfort must be avoided, so that the current must never be rapidly increased or diminished. Applications may be given twice a week for two or three months, but as has already been indicated, the results obtained in cases of amenorrhœa are less favourable than in cases where menstruation is scanty and painful. Electrical treatment, however, should perhaps be limited to the latter group of cases on account of the youth and single state of most patients with primary amenorrhœa.

Occasionally menstruation appears only after marriage, the sexual act seeming to apply the necessary stimulus for its onset. Indeed, a patient may menstruate for the first time after the birth of a child. If the practitioner is consulted regarding the advisability of marriage, he should recommend postponement to see if menstruation becomes established. The later menstruation appears, the more remote the chances of pregnancy occurring.

Primary Permanent Amenorrhœa.—A thorough examination of the pelvic contents should be made when a patient who has never menstruated is over twenty years of age. The practitioner should urge examination most strongly if the patient is of a "masculine type." In many instances it is advisable to administer a general anæsthetic before proceeding to ascertain the degree of development present in the uterus and adnexa. In cases where the uterus is found to be in a marked state of under-development, the practitioner need not hesitate to assure the patient and her relations that treatment is unnecessary, as no change can be effected.

Atresia of the vagina is usually suggestive of an immature uterus, but on the other hand the vagina may be normally developed,

while the uterus is apparently absent. If on pelvic examination we discover, by passing the sound, that the uterine cavity is less than 2 inches in length, while the ovaries are also ill-developed, no treatment need be adopted, as menstruation will probably never become established. This is almost certain to be the case if the patient is over twenty-five years of age.

Secondary Amenorrhœa.—The treatment of this variety of amenorrhœa depends entirely on its causation. Most of the cases are due to *pregnancy*, and, therefore, require no treatment, but some consideration ought to be given to the amenorrhœa connected with *lactation*. If the child is suckled for too long a period, menstruation may fail to appear when the child is weaned. This may be simply due to the unsatisfactory condition of the mother's general health, or it may be that super-involution has occurred. The latter condition should be suspected when examination reveals the presence of a shrivelled uterus, which resembles the post-climacteric uterus. In such a case no treatment is necessary as menstruation cannot be re-established. To a certain extent we can prevent amenorrhœa from following lactation if we prohibit the mother from suckling her child for a longer period than eight months, and she should only suckle it for this length of time if her general health remains good. Many mothers object to wean the infant until they are compelled to do so as they believe that while they are nursing they cannot conceive. This is, of course, incorrect. The practitioner, therefore, ought always to make a bi-manual examination to ascertain whether the uterus is gravid or not, when amenorrhœa persists for some months after weaning. If, as a result of our examination, we come to the conclusion that the uterus and adnexa are quite normal and that there is nothing to account for the amenorrhœa but simple anæmia, then general tonic treatment is indicated. When this fails to bring about the desired result we may achieve it by enforcing a rest cure. While the patient is under treatment, she should be isolated from her friends. During the "cure" she should be kept lying on her back; she must not even be allowed to feed herself, and in addition she should be massaged by a skilful masseuse for an hour each day. The diet, which should be abundant, should consist of light, easily digested food and large quantities of milk. At the outset she may start by taking 2 pints of milk in the day, but this should be gradually increased until the quantity consumed amounts to 6 or 8 pints in the twenty-four hours.

Apart altogether from lactation, the amenorrhœa which results from *general debility* can be best treated in a similar manner,

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provided that the patient is not the subject of tuberculosis or some other progressive and wasting disease.

When *chlorosis* is the cause, a rest cure is seldom necessary or advisable. Fresh air, sunshine, a light yet nourishing diet, and the use of an iron and arsenic mixture will bring about a cure.

When amenorrhœa occurs in abnormally stout young women of sedentary habits, attention should be given to the patient's diet and her mode of living. Benefit will be derived from such exercises as walking, riding and swimming, while medicinal treatment should be confined to the use of saline cathartics and thyroid extract. Thyroid gland ought never to be prescribed, however, unless the patient can be kept closely under observation, as in certain individuals who are peculiarly susceptible to the action of the drug alarming cardiac disturbances occur after its use. It can most conveniently be prescribed in compressed form. To begin with a 1½ gr. tablet should be given after each meal. Gradually the dose is increased until the patient is taking three tablets three or four times a day. Immediately after taking the drug the patient should lie down for the space of half an hour. Potatoes, sugar, starchy food and alcohol should be excluded from the diet. The treatment of obesity is dealt with fully in Vol. I.

Not infrequently girls who have gone abroad cease to menstruate for several months until they become acclimatised, but in these cases no drugs need be prescribed unless symptoms associated with suppression of menstruation supervene, when hot baths, quinine, etc., may be ordered. Amenorrhœa occurs also in morphinomaniacs, but it is clear that in these cases our duty is not to treat the amenorrhœa, which is merely a symptom, but to try and cure the patient of her pernicious habit. Bromides are indicated for the amelioration of the unpleasant symptoms which sometimes occur at the menopause or after the operation of oöphorectomy. When suppression of menstruation takes place as a result of exposure to cold and wet, the patient should be given a hot hip bath, hot drinks and quinine. Local stimulation should be avoided, but otherwise the treatment resembles that which has already been described for a case of primary temporary amenorrhœa in which menstruation is imminent.

Crypto-menorrhœa or Hidden Menstruation.—This condition depends on a congenital malformation involving the lower portion of the genital tract. As the malformation consists of a septum or a thick barrier of tissue, the menstrual products will accumulate in the genital passages above the deformity during each menstrual period. It is obvious that this condition can only be remedied by

an operation, the severity of which will depend on the extent and situation of the tissue causing the obstruction. An abdominal hysterectomy is usually necessary when the Fallopian tubes as well as the uterus are distended with blood (*hæmato-salpinx* and *hæmatometra*). The reason for such radical procedure is that although we may be able by means of a vaginal operation to establish an outlet for the contents of the vagina and uterus, yet such an operation may fail to relieve the distended tubes. As the tubal contents are very liable to become infected there is always the danger that a *pyo-salpinx* may form, in which case the patient might suffer from a severe attack of pelvic peritonitis.

When the tubes are not distended and the obstruction is situated in the cervix, this structure should be dragged downwards to the vaginal orifice by means of volsella. If the obstruction consists of a thin septum, a sound may be thrust through the septum into the uterine cavity. After three or four Hegar's dilators have been introduced to dilate the opening the uterine cavity should be gently irrigated with several pints of a sterilised saline solution (1 drachm to the pint) at a temperature of 115° F. The metal catheter which is used should allow the fluid to return easily from the uterine cavity, and before the patient returns to bed the uterus should be compressed bi-manually to expel all fluid from the cavity. No packing need be left in, but as closure is very apt to occur in the canal at an early date the patient should be advised to return once a month to have one or two dilators introduced.

Sometimes the tissue obstructing the canal is so thick and dense that it cannot readily be perforated. As forcible attempts at perforation will probably result in the formation of false passages, it is safer to resort to amputation of the cervix. In order to get above the obstruction a high amputation should be performed. Occasionally brisk hæmorrhage occurs during the amputation, and if the practitioner is inexperienced in gynæcological operations he may readily wound the bladder wall, so that he ought not to undertake the operative treatment of the severe cases of cervical obstruction. When the uterine contents have been evacuated, a row of interrupted catgut sutures is inserted round the stump to bring into apposition the edges of the vaginal mucous membrane, and of that lining the cervical canal.

When the obstruction is situated in the vagina, the operative treatment depends on the extent of the obstruction. It may be represented by a membranous band situated immediately above the hymen, or the hymen itself may be complete, although the latter condition is decidedly rare. The septum may be pushed

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downwards by the darkly coloured products until it projects beyond the vaginal orifice. To remedy this condition a simple or crucial incision through the membrane should be made, when the products will flow out. This is generally all that need be done if the patient is made to sit upright in bed, but many gynæcologists recommend that the uterine cavity should be douched and then packed with iodoform gauze, as sepsis is liable to supervene. The gauze should be changed daily. A thick sterilised pad of gauze and wool should be placed over the vaginal orifice and retained there by a T-bandage. If the greater part of the vagina is represented by a solid cord of tissue, then a communication between the lower part of the vagina and the uterine cavity may only be established after an extremely tedious and difficult dissection. Even with a sound in the bladder, and the frequent insertion of the finger into the lower bowel to act as guides, these viscera are very liable to be wounded during the operation. A dissection of this description should therefore not be attempted by a practitioner unless he has an extensive practical knowledge of pelvic surgery.

After an extensive dissection it is sometimes extremely difficult to maintain the patency of the vagina. In order to prevent closure, the constriction should be dilated with a Hegar's dilator every week for a considerable time, or a stout glass tube may occasionally be left in the vagina overnight.

Abdominal hysterectomy is perhaps the better treatment to adopt when there is extensive vaginal obstruction, as the operation can be easily performed without any risk of wounding the viscera.

By performing this operation the prolonged course of treatment so necessary after free vaginal dissection is avoided, and, moreover, the results which ensue from the latter operation are so frequently unsatisfactory that the operation of complete removal of the uterus can often be recommended without much hesitation.

Scanty Menstruation.—The treatment of scanty menstruation merits no special consideration after what has already been written concerning primary and secondary amenorrhœa associated with anæmia or slight immaturity of the uterus. In addition to general tonic treatment, dilatation and curettage of the uterine cavity should be performed when the scanty flow is associated with dysmenorrhœa. In cases which do not respond to this treatment the effect of electricity may be tried. One must never forget, however, that the term "scanty menstruation" is purely a relative one; each patient has her own standard as regards the loss which

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occurs at her periods. Treatment is quite unnecessary so long as a patient feels in perfect health, and provided that the amount which she loses at her periods when she comes under observation is not less than the amount which she has hitherto been in the habit of losing.

SAMUEL J. CAMERON.

DYSMENORRHEA.

ALTHOUGH the scope of this article is not intended to include anything beyond treatment, yet it is important to say a few words with reference to the etiology of the affection, in order that a clear idea may be formed of the reasons for the practical application of the various methods of treatment suggested. In the first place, it is important to realise what dysmenorrhœa really is, and to put aside all affections which may be associated with it, and which are sometimes apt to be looked upon as the cause of the disease. Dysmenorrhœa is a disease and not a symptom, and may be defined as painful contractions of the uterus during menstruation. The forms of dysmenorrhœa described in various books under the headings of idiopathic, congestive, membranous, obstructive, ovarian and neurasthenic, are, in the opinion of the writer, unnecessary and misleading. Various affections may be associated with menstruation, and may become worse at its approach, during its presence, and when it is passing away, such as neurasthenia, chorea, neuralgia, etc., but that is no reason for speaking of neurasthenic dysmenorrhœa, which only means that the condition of neurasthenia is intensified by menstruation, or that neuralgia becomes worse. This undoubtedly depends on the lowered tone of the nervous system in women at the time of menstruation. The cause of the pain of dysmenorrhœa is a severe spasm or cramp of the uterus: we all know what severe pain may be produced by cramp in the muscles of the calf. The uterine spasm may be tonic or clonic, and I believe that it is the true tonic contraction, which in severe cases of dysmenorrhœa, brings about the actual collapse from the severity of the pain. The clonic contractions may continue indefinitely, causing severe pain, but pain which comes and goes, and which does not produce the profound impression on the nervous system caused by the tonic contraction. It is important to remember that the painful contractions occur at menstruation, for, although ovulation and menstruation come about the same time, ovulation often follows menstruation, and may occur between menstrual periods. The ovarian changes which precede ovulation, by producing ovarian tension, reflexly excite the uterus and cause menstruation, but may set up much pain before its arrival.

What is the cause of this uterine contraction? At the present moment we cannot say definitely what produces this painful affection, although there are many theories. The explanation most usually given, and to which, therefore, I must refer, is the mechanical theory, and if text-books are consulted it will be found that the explanation given is that there is ante-flexion or retro-flexion, which obstructs the flow. I do not accept this theory of obstruction, for I do not believe, however acute the ante-flexion may be, that the flow is hindered sufficiently to influence the uterus in producing pain. The most striking argument to be adduced in support of this is that in some cases of hæmatocolpos, where we know that there is a complete blocking of the exit from the uterus, no pain is complained of. In addition to this, we know that more than half the cases of dysmenorrhœa come on in women who have not borne children, after menstruation has been regularly and painlessly established. Again, I have operated in some cases of sterility when only the finest probe could be passed through a pinhole os, and yet no pain has been complained of at menstruation, and there was the normal amount. No amount of acute ante-flexion or retro-flexion blocks the canal sufficiently to prevent gradual flow, however slight it may be, from the cervix, and therefore this cannot be considered a sufficient explanation of the pain at the period. The average amount of blood lost during menstruation is about 4 oz., and if this is distributed over, say, four days, it gives an average loss of one-third of a drop in every minute, which will not be difficult to pass along any cervical canal.

It is quite easy to make a large number of headings under general and local causes, uterine or extra-uterine, primary or acquired, but this serves no practical purpose, for we are no further towards an explanation. It is usual to advance chronic metritis or pelvic congestion as the cause, but they are no explanation at all. Women suffering from metritis or endometritis are liable to have pain or discomfort increased at the time of the period, for the whole of the uterus and adnexa become more charged with blood, and the tension is raised. It is therefore natural that discomfort and pain should be increased, for we know how much tension in the vessels has to do with pain. In all women, as menstruation comes on, there is a rise in vascular tension as well as a slight rise in temperature, and because in dysmenorrhœa it may be proved that metritis or endometritis, or acute ante-flexion or retro-flexion is present, the conclusion is arrived at by some that it is the cause of the pain. The menstruation only aggravates the pain produced by the congestion, with the origin of which

menstruation has nothing to do. This applies to all pelvic affections, whether of the uterus, tubes, or ovaries. But this cause, even if it did exist in married women, could not be adduced as a cause in virgins, for I know of no work on pathology which states that endometritis is common in them, whereas we know that dysmenorrhœa is. If it occurs at all, it must be rarely. In membranous dysmenorrhœa it might be that there is some obstruction, and that the spasmodic pain is caused by the efforts of the uterus to expel the membrane. The expulsion of the membranes, or complete casts of the inner surface of the uterus, is frequently associated with dysmenorrhœa, as is familiar to all, and, indeed, it is often the presence of these membranes, or complete casts, which induces a patient to seek medical advice. That they are not the cause of the pain is proved by the knowledge that these casts may be expelled without any pain at all. If certain questions are put with reference to menstruation, it will frequently be found that shreds or membranes are passed quite commonly without the least pain. I have had cases which have come before me only because a complete cast of the inner surface of the uterus has been passed on one occasion, and although the patient has known that she has regularly passed shreds, she has paid no attention to them until alarmed by the presence of the cast.

In membranous dysmenorrhœa much depends upon the period of degeneration in the menstruation, which I need not go into now; but it may be shortly said that the mucous membrane of the uterus exhibits (1) the period of growth in the five days preceding menstruation, characterised by a rapid increase of the stroma, blood vessels, epithelium, etc., of the membrane; (2) four days of menstruation, or period of degeneration, during which capillary hæmorrhage takes place, and the epithelium suffers degenerative changes and is cast off more or less; (3) the seven days' period of regeneration, during which the mucous membrane returns to its normal state; (4) the twelve days' period of rest, during which the endometrium remains in a quiescent state. Gellheim explains the pain as being caused by dragging on the peritoneum, an explanation which will not suffice in a normal pelvis, but may serve when the mechanism of the dragging process is considered in those cases in which direct or indirect adhesions between the uterus and parietal serosa are found.

It is important to ascertain whether the condition has existed from puberty (primary dysmenorrhœa) or whether it has developed late (secondary dysmenorrhœa), the latter being more frequent,

as much as 58 per cent. Both primary and secondary dysmenorrhœa are found with extraordinary frequency in girls with constitutional affections (chlorosis).

It must be borne in mind that all uterine contractions are not painful. It is now known that there are contractions continually going on in the unimpregnated uterus, and that these are intensified at menstruation. They are sufficient to get rid of blood, degenerated mucous membrane, or complete casts of the uterine cavity without causing pain, but the contractions with which we have now to deal must be considered to be morbid. In some, these contractions are intensified by a small or large fibroid in the wall of the uterus, or by a polypus in the cavity setting up irritation and acting as a foreign body. It is most important to remember that if a woman who has menstruated regularly and naturally for many years seeks advice because of increasing dysmenorrhœa, it is extremely suspicious, and at once a fibroid or a polypus must be thought of as the cause. This is one of the affections classed under "obstructive dysmenorrhœa," but, as already pointed out, in my view it ought not to be so spoken of. All who are in the habit of seeing many cases of dysmenorrhœa have doubtless some theory to account for these morbid contractions. Herman's theory is that dysmenorrhœa exists because the centres in the spinal cord or in the sympathetic system which regulate the movements of the genital canal are imperfectly developed. In the normal painless menstruation there are contractions of the body of the uterus and dilatation of the cervix, so that the menstrual fluid is expelled without pain or difficulty. His theory is that in dysmenorrhœa this natural dilatation of the cervix is absent, and in consequence the contractions of the uterine body are morbidly violent and painful. I agree with Herman in thinking that the pain of dysmenorrhœa is caused by painful contractions of the body of the uterus, and that the dilatation of the cervix which normally ought to take place does not occur; but I do not think that his theory can be altogether accepted, for otherwise I do not believe that the disease could be cured by dilatation, or the relief would be so temporary that constant dilatation would have to be undertaken because of the undeveloped nerve-centre. But the strongest argument against this theory is that dysmenorrhœa may be induced or occur long after the flow has been regularly and painlessly established, and I may here say that if the spinal centre were imperfectly developed, then the onset of the flow would be painful, and continue to be so, but we know that this is not always the case, and that the most severe cases of dysmenorrhœa may have remissions. If the imperfectly developed

centres became gradually developed and the dysmenorrhœa ceased, then it would be difficult to explain why there should be a recurrence of the pain.

My own theory of this disease is that it is caused by the circulation in the blood of some bio-chemical material acting on the hyperæsthetic membrane of the uterus, and possibly also upon the nerve-centres regulating the genital canal, and that this material is due to faulty secretions of the ovaries. My ground for this is that if any ordinary woman is examined with a uterine sound, directly it passes into the region of the internal os and beyond she complains of discomfort, or, at any rate, it is disagreeable to have the mucous membrane, which is normally very sensitive, touched, but she can bear the examination perfectly well. Now, if you examine a patient who suffers from dysmenorrhœa with a probe, directly it passes into the internal os she will say that it is extremely painful, and if you continue to introduce the probe so that it touches the uterine mucous membrane she may declare that it is intolerable. Now, afterwards, on withdrawal of the sound, she will say that the pain she complains of is exactly as at the time of the period, and this same kind of pain may continue for some time after the examination. The touching of the mucous membrane by the sound produces apparently a reflex action, and a painful contraction of the uterus ensues. Anything which acts as a foreign body will do the same, and this, in my opinion, is the explanation of the painful contraction in membranous dysmenorrhœa; the shreds or casts irritate the hyperæsthetic mucous membrane. It seems to me that as the onset of menstruation occurs, and an increased secretion commences, which is sufficient in a condition of hyperæsthesia to irritate the mucous membrane in such a manner that reflex painful contractions occur, these spasms continue until the mucous membrane becomes adapted to the continued irritation; or, in other words, until the irritability of the uterus is exhausted and pain no longer occurs, or the source of irritation in the circulation is no longer present, when the reflex action ceases. As in this disease there is this irritable mucous membrane, which is the only part we know must be morbidly affected, it seems reasonable to assume that in some way it accounts for the spasm of the uterus. It is not, however, easy to explain what causes these changes of the mucous membrane to bring about this hyperæsthesia; whether the irritation is due to some secretion or alteration in the blood, it is impossible to say. We know from Gautier and Dousier that menstrual discharge contains four times as much iodine as normal blood, and an amount of arsenic equal to

the whole quantity normally present in the thyroid gland. It is, therefore, possible that this is sufficiently irritating to act on the hyperæsthetic mucous membrane. But, in any case, there evidently seems to be an irritant, which acting on a morbidly hyperæsthetic mucous membrane, or directly on the nerve centres, produces painful contractions of the womb. Matthews Duncan likened this disease to spasmodic asthma, where there is also doubtless a hyperæsthetic mucous membrane, in this case of the bronchial tubes, difficult of explanation. It is well known that at the onset of the period there is an alteration of the blood-pressure. After rising it falls slowly, the minimum being coincident with the appearance of the flow. This may be due to the action of the ovarian secretion influencing the spinal centre for the genital canal or region and vasomotor areas. It is possible that this ovarian secretion, which undoubtedly has a powerful influence on the blood, may, under certain conditions of health, contain an irritating material which acts on the mucous membrane of the uterus. When the amount or properties of the ovarian juice or secretion are absolutely normal, no alteration takes place in the regular menstruation, but when it contains some abnormal constituent, or its elements are not duly proportioned, then its action on the blood causes the secretion preceding menstruation to irritate the uterine mucous membrane and give rise to the reflex action, leading to painful contraction. It is probable that in time we shall know more of the functions of this ovarian secretion, but at present we can only theorise as to its possibilities. It certainly seems reasonable to believe that the proper action of the ovaries and their secretion must have everything to do with menstruation being carried on in a perfectly normal manner. We now know that upon the equilibrium of the blood glands depends our health, and as our knowledge becomes extended, we may hope to ascertain exactly the action of the ovarian secretion. With spasm or intense contraction all the muscular fibres squeeze the nerves supplying the uterus, and so cause pain. In some cases it is possible that actual neuritis of some of the nerves may take place, leading to continued discomfort in the region of the womb long after the period is over. It is probable that the continued contraction of the uterus causes a slight amount of hypertrophy of muscular tissue; at any rate, the cavity tends to become elongated. In nearly all cases of well-marked dysmenorrhœa on which I have operated the sound measured an increase of $\frac{1}{4}$ in. to $\frac{1}{2}$ in. This enlargement is more likely to be due to repeated severe contractions of uterine muscular tissue than to anything else, and is analogous to the

ordinary hypertrophy of muscular tissue from overuse. I do not believe that a small uterus (the so-called infantile uterus) has anything to do with dysmenorrhœa. No doubt it is frequently associated with dysmenorrhœa, but I believe that the cause of dysmenorrhœa is exactly the same as in patients with a normally developed uterus, and the actual ill-developed uterus follows the same laws in this disease as the well-developed one. I have so frequently found hypertrophy associated with this disease that I cannot agree with Theilhaber's theory that the pain is due to a badly developed uterine muscle.

Prophylaxis.—It is only prudent to advise girls to be careful of themselves without making any fuss at the time of the period. I see no reason to advise a healthy girl to remain in bed for the first day, but I know that many brought up in luxury are made by their mothers to do so. If a girl is really healthy, beyond giving directions for sensible care at the time of the period, nothing more need be done. It is a mistake to educate healthy girls to the belief that it is necessary to look upon the period as an illness. There are, unfortunately, only too many who are really delicate, and who are obliged to look upon themselves as invalids for so many days of every month; but those who do not suffer and who enjoy good health may go about their lives as usual, merely taking care to avoid any violent exercise. It is also important to advise girls to avoid, if possible, passive chill, and to clothe warmly during cold weather.

One other cause which I believe will induce dysmenorrhœa in those who have not previously suffered from it is over-fatigue, often most difficult to avoid, but cold and over-fatigue together are, in my opinion, a fertile cause of the onset of dysmenorrhœa. If a girl who has a good family history, and has good health to start with, lives an ordinary healthy life, with plenty of fresh air, attending to hygienic laws, she apparently ought not to become subject to dysmenorrhœa. About this, however, strangely enough, nothing positive can be said, for sometimes the most healthy-looking girls gradually develop dysmenorrhœa, and others who are delicate, anæmic and feeble pass through each period without any trouble. It is impossible to forecast the future menstrual history of any girl who is commencing womanhood, however well she may be at the onset. I have very frequently observed that there is a family history of dysmenorrhœa for several generations.

Palliative Treatment.—In slight cases of this disease, when a girl is complaining of malaise and headache and only a little pain, rest and warmth will probably be sufficient. The application of dry

heat, in the form of hot-water bottles and a simple hot drink, will probably be all that is required for relief. As to the drink, it may be hot barley-water, or milk and water. In the slight cases, hot fluid is sufficient, whatever it may be, and the addition of alcohol is unnecessary, especially if the patient is not in the habit of taking any. If the pain is not rapidly overcome by this, then some ordinary analgesic medicine may be given.

In the severe cases the patient is obliged to go to bed. In some, however, in which, although the pain is very severe, it is not sufficient to cause sickness or faintness, she may be able to keep about. This entirely depends upon her nervous system, and power of self-control. As a rule, it is impossible to keep about during the whole of the time, and retirement for an hour or two at least is necessary. In such cases the pain may be overcome by immediate treatment.

As soon as the first indication of pain occurs, if it is by day and it is possible to do so, a hot sitz bath of ten or fifteen minutes' duration often gives great relief. An ordinary hot bath is, as a rule, of no use; the patient must immerse the middle of the body in the bath, the legs and the upper part of the body being still covered. It is agreeable to add hot water as the water cools, so that the temperature is kept up, and the patient may have it as hot as she can comfortably bear it. After this, if she is put into a well-warmed bed, with an indiarubber hot-water bottle to the back and one on the abdomen, great comfort will be given. It is of importance to let the patient lie on a hot-water bottle, because there is usually so much sacral pain, and the dry heat affords immense relief. Sometimes the abdomen is so tender that the hot-water bottles cannot be borne. In these cases I advise a very thick layer of wool, which has previously been baked in the oven until quite hot (this can be done in an ordinary tin box), to be applied all over the abdomen. Sometimes the addition of laudanum to the surface of the wool is beneficial. It is light and can be easily borne. If the abdomen is very tender, the application of equal parts of liniment of aconite and liniment of belladonna is particularly soothing, combined, if it can be obtained, with the heat. At the same time, I order a teaspoonful in a wineglassful of water of granular effervescing phenacetin, containing either 5 or 10 gr. to 1 drachm, according to the severity of the pain. If the patient is not better in twenty minutes, this is to be repeated with 1 drachm of brandy, and if in another twenty minutes relief does not come, I give a third dose, with another drachm of brandy. The pain is usually relieved after two or three doses. It is best to give a little alcohol with the phenacetin if more than one dose be given, to prevent the depressing

effects on the heart. Should it be necessary, a dose can be given every four hours after the second or third doses have been given.

In a certain number of cases vomiting comes on early with the pain, and whatever is ordered may be rejected. It is usually better to order the effervescing mixture whenever there is a tendency to nausea or sickness, as it seems to be more easily borne, but some may prefer it in the form of cachet or powder. Should vomiting be frequent, mustard to the epigastrium may be applied, often with good results. It is well to bear in mind that when the pain is soothed and vomiting has ceased the patient should not be allowed to get up or make any effort too soon, for the pain and nausea or sickness may recur immediately on exertion. Should no vomiting or nausea be present, nourishment in some easily digested form should be given during the period of pain. Sometimes, if the pain comes on before the flow, much relief may be obtained by 1 pint of hot saline solution given *per rectum*, with 30 or 40 gr. of bromide of sodium or ammonium added; it must be retained to be of service. There are certain cases in which this seems to answer well, but if relief can be obtained by other means, I prefer them.

A hot saline injection, with a fair dose of phenacetin, may be given if the patient is too sick to take anything by the mouth. Fifteen grains may be given, and repeated later should it be necessary; but if a second injection is given, it is safer to give brandy with it to counteract the depressing effects of the phenacetin.

The old-fashioned foot-bath, with a little mustard, is invaluable in certain cases. Emmett recommended in addition a hot mustard-plaster, about 3 inches in width, reaching from the cervical region of the spine to the sacrum, and also dry-cupping when the flow is delayed, which I have seen give great relief.

For the agonising form, if large doses of phenacetin or such-like drugs do not afford relief, the only remedy is morphine hypodermically. Fortunately these cases are rare, and recourse to large doses of morphine is unnecessary; but it is well always to remember the danger of giving morphine to a patient suffering from dysmenorrhœa, for the habit of taking morphine is easily established, and as the pain recurs every month the temptation to increase the dose is ever present. In giving it for these most severe cases it is better to combine it with atropine, to avoid the risk of sickness. For phenacetin may be substituted aspirin, novaspirin, chloretone, or any similar drug, and occasionally amyl nitrite or nitro-glycerine; but it must be remembered that all these drugs only soothe the pain and tide over the attack. What we have to study is the cure of the disease, and none of the drugs I

have named will do this. Unfortunately this disease has no tendency to become cured without treatment. We must endeavour to find a drug which will so act as to prevent the onset of this severe pain, or, at any rate, greatly mitigate it, so that when the period occurs the patient will not suffer much. One of the drugs most commonly used is guaiacum. It is often excellent, and it is best given at least a week before the period is due, in doses of 10 gr. three times a day. I have not found it of as much service as tannate of cannabin, which, in my experience, seems to have done more good than anything I have tried. I give it in the form of a pill three times a day after meals, for seven days before the period is expected. It may be given in doses of from 2 to 3 or 4 gr. and, if preferred, may be continued through the period in increased doses. I usually stop it when the pain comes on, if at all bad, and give one of the coal-tar analgesic remedies; but if the pain is not severe, the tannate of cannabin may be continued until all chance of recurrence of the pain has disappeared. With it I frequently give ovarian substance. The treatment should be continued for some months before being discarded. The only disagreeable symptom I have known, and that has been quite rare, has been a certain amount of looseness of the bowels, which has made it necessary to stop the drug, but this is the only point worth mentioning about its administration. I used *cannabis indica* for a considerable time, and although it was often of great service, I frequently found that it produced a mild form of delirium or excitement, and as this was sometimes alarming to the friends, I gave it up, and now never use it. Bromides are often of great service, but they ought to be commenced some time before the onset of the period, and are apt to cause in some patients a certain amount of depression. Amongst other drugs I have often found *viburnum prunifolium* of service, as well as sodium salicylate. It would be useless to enumerate all the drugs which have been advocated in the treatment of this disease. I have had better results from the use of cannabin tannate than from any other drug. I believe it acts, as all drugs which benefit do, by soothing the hyperæsthetic mucous membrane.

I must merely mention the treatment by Fleiss of the application of cocaine to the "sexual spots" on the nasal mucous membrane. In a paper by Dr. Koblanek on nasal reflexes, he advocates the application of cocaine to the so-called "sexual spots" in the nasal mucous membrane in some forms of dysmenorrhœa. I will not discuss this treatment, for I have had no experience of its use. Kolischer attributes good results to suggestion.

In many cases I have certainly done good by the administration of ovarian substance, and I have found that, when used in the cases of fat anæmic girls, it answers well when combined with iron or arsenic. The administration of ovarian substance must be watched, for sometimes it causes nausea. I usually give tablets of 5 gr. (containing 0.32 gramme) two or three times a day after food, sometimes commencing with 2 gr. or $2\frac{1}{2}$ gr.

Before passing to operative measures I must refer to Boult's opinion that there is an antagonism between the physiological function of the ovary and mammary gland, and that menstruation is to be considered as a process which is set going by the biological power of the ovary. He has attempted to overcome the intensity of the pathological conditions of menstruation, and, above all, of dysmenorrhœa, by artificial stimulation of the mammary gland. He has employed a breast-pump, and has produced some days before menstruation, and during it, engorgement of the mammary gland. He states that he has seen good results follow this treatment, both in the abatement of the pain, and in the diminution of the flow of blood.

Surgical or operative treatment may be briefly divided into dilatation of the cervix and removal of the ovaries, the latter not to be undertaken without the most serious consideration. Now dilatation is, on the whole, a most successful operation, and all those who have had special experience in the treatment of this disease are favourably impressed by the results. It imitates nature's cure, which is pregnancy, for then thorough dilatation of the cervix is secured; but, unfortunately, we know that dysmenorrhœa is frequently associated with sterility, so that this natural cure is often denied the patient. Some prefer to incise the os laterally before dilating, or to cut out a wedge-shaped piece from the cervix all round the canal. Others divide the cervix, stitching back the angles, so as to insure their remaining permanently patent. In my own practice I hardly ever incise the cervix. It need only be done at the time of dilating, if the os is extremely small. Incision of the internal os, which involves unnecessary risk, is practically never done now. It used to be much in vogue, and gave relief, probably by dividing the circular fibres, and giving them rest from spasm. This object is, of course, gained by slow dilatation of the cervix. As a rule, I use the ordinary Hegar's metal dilators, and do the operation at once, under an anæsthetic. If the patient has no time to devote to rest afterwards, it is better not to do it at all.

The operation of dilatation should be accompanied by the same precautions as any other surgical operation. There ought to be

no such thing as a minor operation in surgery, because every operation undertaken ought to be carried out with scrupulous care. The patient should have an aperient the evening before the operation, and an enema the first thing in the morning, so that the lower bowel should be thoroughly cleaned out. Overnight an antiseptic douche should be given of 1 in 4000 corrosive sublimate, if the patient is married, and again before the operation. If the patient is unmarried, and has never had any vaginal examination, then the matter of the douching can be left until she is on the table. After the anæsthetic has been administered the patient should be placed in the gynæcological position, the hair shaved away, if this has not been previously done, and the vulva and perineum thoroughly washed with ether soap. An antiseptic douche should then be again given. The abdomen and pubes should be covered with a sterilised towel, and the limbs encased in loose linen sterilised stockings, so that, should any of the instruments by chance touch the linen, no harm will be done. After the douche has been administered, a speculum is placed in the vagina, the walls of which are to be thoroughly swabbed with wool dipped in an antiseptic solution, and the anterior lip of the os uteri caught with the volsellum. It is best to place a pad of sterilised wool over the urethra, so that no damage can be done by any pressure of the volsellum. The sound should then be passed, and the length of the cavity of the uterus measured. This will also indicate whether the fundus is to the front or to the back. The Hegar dilators are then passed, from the smallest size upwards. There are several forms of dilators, but the ones I recommend are Hegar's, made of metal. They are more satisfactory than any others, although, of course, most operators prefer the ones that they are most accustomed to use. It is important to remember that each dilator should be carefully passed, and should not be forced. A gentle, steady pressure in the cervix will cause the muscle to gradually yield. If the dilatation is done too rapidly, the mucous membrane is apt to crack, which may possibly lead to inflammatory disturbance afterwards as well as hæmorrhage, which may be sometimes rather troublesome at the moment. As a rule, however, if every antiseptic precaution is taken during the application, even the splitting and cracking of the mucous membrane does not do any real harm.

To those who have not done the operation, it must be borne in mind that it is not difficult to pass a fine dilator through the uterine wall. There are many instances of this on record. After the number is reached which the operator finds to be the largest which can be borne by the cervix, no further dilator need be used. The

volsellum is removed, and an antiseptic douche is then given, care being taken that the fluid reaches all parts of the vaginal walls, and this is best accomplished by pulling gently on the handle of the speculum, so that the perineum is distended and the vagina well filled. A sterilised pad is then placed over the vulva, and the patient removed to bed. Unless there is any bleeding, it is better not to use any vaginal tampon at all. Should there be bleeding which is at all troublesome, it is prudent to put a tampon into the vagina. It will be rarely necessary to plug the cervix on account of bleeding.

Should there be evidence of endocervicitis or endometritis, and it is considered advisable to curette at the same time, this may be done after thoroughly dilating the cervical canal. It is prudent first to use a blunt curette, so that no possible harm can be done to the walls of the uterus. After the blunt curette has been used, a flushing curette can be substituted, so that whilst the curetting is being done an antiseptic douche is being applied to the walls of the uterus. It is well to bear in mind that no force whatever should be used in curetting, for it is not a difficult matter to perforate the uterine wall. After the curetting is finished, it is useful to apply the tincture of iodine to the mucous membrane. If there should be any troublesome bleeding, the uterus must be plugged, but it is far better not to use any plug at all, as it diminishes the risk of the operation. If plugging is necessary, it is best done with plain sterilised ribbon-gauze. If, however, there should be no bleeding at all, then there need be no plugging or any vaginal tampon. If it has been necessary to use a tampon, it may be removed in twenty-four hours, and an antiseptic douche given. Beyond this, however, no douching is required. After thorough dilatation it is best to keep the patient warm in bed for a few days, giving light diet.

Some advocate the use of electricity in the treatment of dysmenorrhœa by the intra-uterine application of the galvanic current, and by others the stem pessary is lauded. I have used neither, and I do not advise the use of the stem pessary, for it cannot be altogether free from risk. It may be that I am prejudiced against it on account of the unfortunate results I have seen from its use.

In cases of dysmenorrhœa, in which there is continued pain over one or both ovarian regions, it is found sometimes on opening the abdomen for some other condition that the ovaries have small cysts all over them. If these cysts are punctured and the fluid allowed to run out, the ovarian pain will sometimes disappear,

because presumably the tension is relieved. When intense pain over one ovary or both is invariably complained of at the outset of or during each menstruation, pain sufficient to incapacitate and prevent the patient from making her living, it may be justifiable to explore. In certain cases the ovary may be found to be cystic, as above mentioned, and in some cases I have seen adhesions from previous local peritonitis. If these are thoroughly broken down, without doing anything further the patient may be cured.

Some resort to gradual dilatation, that is, passing a dilator, increasing in size every two or three days until the full size is reached. I do not recommend this proceeding. It is tedious and somewhat risky, and certainly very painful. I have known parametritis to follow in the practice of more than one who passed the dilators in his own house. It is best to operate under an anæsthetic and to pass each dilator slowly, so that the cervix may be slowly and steadily dilated and not torn. My own experience is that if the dilators pass with considerable difficulty there is much better prospect of a cure than if they enter the cervix easily.

And, finally, there is oöphorectomy. This is a matter upon which the patient, and she alone, ought to be the judge. It must, of course, be most strongly condemned unless done only after the most serious consideration. If the woman is of a certain age, shattered in health, with no prospect of relief in spite of all kinds of treatment, and if she is willing to relinquish the chance of child-bearing, then I think that her request for the operation, which will stop menstruation and cure her pain, ought to be attended to. I would say this, however, that her statements as to her sufferings ought to be corroborated by the relations or friends with whom she lives. No one should undertake this operation without feeling satisfied that the patient had had everything for and against the operation placed before her, and, above all, it is essential that absolute certainty should prevail as to the diagnosis of the disease.

I have already referred to the occurrence of dysmenorrhœa in neurasthenic patients. Be certain, before undertaking an operation of this kind, that the patient is really suffering from genuine spasmodic dysmenorrhœa, and that she is not a neurotic woman with pain intensified at the time of menstruation.

In conclusion, I would say, with much regret, that I do not consider we know any more about dysmenorrhœa which will enable us to speak positively as to its etiology or pathology than we did years ago, but I cannot help feeling that further

observations as to the secretions of the ovary may open up a wide field of knowledge. The exact relation between the ovary, the thyroid, and the other ductless glands is still obscure; but we must earnestly hope that the time is not far distant when we shall be enabled to speak positively about the action of their important secretions, and that a true explanation of the occurrence of dysmenorrhœa may be forthcoming.

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MENORRHAGIA AND METRORRHAGIA.

In considering the treatment of menorrhagia (excessive bleeding from the uterus at the menstrual periods), and of metrorrhagia (irregular losses of blood from the uterus between the periods), it is important to differentiate clearly between the various causes of these two conditions.

Excessive or irregular hæmorrhages from the uterus may be associated with: (1) Pregnancy; (2) various general diseases; (3) certain pathological conditions of the pelvic organs; (4) certain periods of the woman's life, for example, puberty and the menopause.

The treatment of the varieties of hæmorrhage occurring in connection with pregnancy does not come within the scope of this article.

Hæmorrhage from the uterus in the course of an acute illness, such as influenza, or pneumonia, or one of the acute specific fevers, for example, smallpox or scarlet fever, or in such chronic affections as uncompensated mitral disease, alcoholic cirrhosis of the liver, and pernicious anæmia, as a rule, is an unimportant symptom, and calls for no or but slight special treatment. There are, however, some general diseases, for example, purpura and hæmophilia, in which uterine hæmorrhage may be very severe and require energetic treatment.

The principal diseases of the pelvic organs which may be accompanied by hæmorrhage from the uterus are all the forms of malignant disease; the different varieties of fibro-myomata of the uterus; endometritis and metritis; some tumours of the ovaries, especially those which are malignant, and occasionally inflammation of the ovaries; inflammation of the Fallopian tubes; displacement of the uterus; and inflammation of the peritoneum or cellular tissue. In many of these conditions the hæmorrhage is the result of pelvic and uterine congestion, and is not due to any actual disease of the uterine wall or mucous membrane.

The hæmorrhages which occur at puberty and the menopause are no doubt often of vaso-motor origin, and in the latter instance are associated with the other vaso-motor disturbances which play so important a part in the causation of the symptoms of the climacteric.

It is evident, then, that in a large number of cases success in the arrest of bleeding from the uterus will depend upon the treatment or the removal of the cause, which may be a diseased tube, an ovarian cyst, a fibro-myoma, or a carcinoma of the cervix or of the body of the uterus. There will remain always, however, a class of case in which, besides treating the cause, if this is possible, it will be necessary to secure the arrest of the bleeding by the administration of drugs acting directly upon the uterine musculature or its nerves; or by the carrying out of various operative procedures for the purpose of making direct applications to, or of removing the unhealthy and bleeding uterine mucosa, or even of removing the uterus itself.

It is this class of case which we have to consider in this article.

General Treatment.—In all cases of excessive bleeding from the uterus rest plays a most important part in the treatment. The patient, when the bleeding is severe, must be confined to bed absolutely in the horizontal position, and should not be allowed to get up for any purpose. Local rest as well as general rest must be enforced, and for this reason, even when the bleeding is not severe, sexual intercourse should be interdicted until it has been arrested. Indeed, in some cases where menorrhagia follows recent marriage, such a prohibition is all that is required to effect a cure. The possibility of this cause playing a part in the production of the hæmorrhage must be borne in mind, not only in the case of recently married women, but also in other cases in which it may come into operation.

For the purpose of reducing pelvic congestion the bowels must be unloaded freely with saline aperients, and this should be continued, although it may appear for the time to increase the loss of blood.

A saline aperient should be given each day, and if the bowels at the commencement of the attack are loaded they should be well emptied with an enema, which has the advantage of avoiding any straining on the part of the patient.

The diet must be light and digestible, but the patient, if she has a good digestion, may eat anything she likes. The old idea that all fluids should be given cold is a useless restriction. Alcohol in any form should be prohibited while the bleeding continues.

It is important to remember that debility, whether it is congenital, induced by overwork and want of proper nourishment, as is so often the case among the women of the poorer classes, the result of too prolonged suckling, or due to living in a tropical or unhealthy climate, may be a very important contributory cause

in the production of menorrhagia, or metrorrhagia. In some young girls, too, suffering from chlorosis, although, as a general rule, this condition is associated with amenorrhœa, menorrhagia may occur. In such cases the general clinical rule never to give iron to a patient who is bleeding from the uterus must be neglected, since it is only by the administration of iron and the cure of the chlorosis that the hæmorrhage can be stopped.

Uterine hæmorrhage also may be aggravated by want of exercise and over-eating, together with an excess in the use of alcoholic stimulants, which often accompanies these conditions.

In the case of robust and athletic young women it is necessary to limit the amount of exercise they are accustomed to take, and to stop such games as tennis or hockey, or indeed any form of violent exercise, so long as the tendency to hæmorrhage continues. Over-fatigue, whether its cause is to be found in overwork or over-play, must be carefully avoided in all these cases.

We have pointed out already the great importance of rest, but it must be rest in the recumbent position, and it is therefore essential that the patient should remain in bed, since in this way alone it is possible to ensure complete rest for a woman, especially when she is laid up in her own home and therefore not removed from her ordinary occupations and worries. The patient should lie on a hard bed in a cool, well-ventilated room.

Between the menstrual periods an attempt must be made to improve the patient's general health by the use of cold baths, or of tepid baths, followed by a cold douche. If a large bath cannot be obtained, then a hip bath should be used. Profuse menstruation often may be checked by the daily use for a few minutes of the cold hip bath. Brisk exercise in the open-air should be prescribed for the lazy and luxurious, and the necessity for keeping windows open by day, and more especially by night, should be insisted upon. In cases associated with the effects of a hot climate a change to the hills or home must be ordered, and obviously, when uterine hæmorrhage occurs during lactation the baby should be weaned at once.

Cases of chronic pelvic congestion with menorrhagia often are much benefited by a course of muriated saline waters, such as may be found at Woodhall Spa or Harrogate, in this country, or at Kreuznach, in Germany. The use of the sulphated alkaline waters of Carlsbad, Marienbad, or Franzensbad, is often beneficial, while the free administration of some of the simple sulphated waters, for example, Hunyadi Janos, Apenta, or Rubinat, forms a very valuable adjunct where the tendency to hæmorrhage from the uterus is

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associated with chronic constipation and passive congestion of the liver.

Drugs.—From time to time a large variety of drugs has been recommended and used in the treatment of menorrhagia and metrorrhagia. A considerable number of these probably have but little effect on the uterus, and those which are employed commonly at the present day and have stood the test of experience are but few in number.

Of these the most important is ergot and its derivatives. Many of the preparations of ergot are inactive, and if the best results are to be obtained fresh and carefully standardised preparations should be employed. The drug may be administered in the form of the liquid extract, the tincture, or the liquor ergotæ ammoniatus (Martindale). Its therapeutic action depends upon certain active principles, of which the most important is an alkaloidal substance called ergotoxine. This in combination with the other active principle of ergot, the organic base, tyramine, is contained in the preparation called ernutine, and this is the best form in which to administer the drug, either by the mouth or hypodermically. Ernutine may be given in doses of $\frac{1}{2}$ to 1 drachm by the mouth, or 5 to 10 min., hypodermically. It can be obtained as a sterile standardised solution in glass phials, which is the most convenient form in which to carry it for hypodermic administration.

Ergotoxine causes marked uterine contractions with resulting narrowing of the lumen of the uterine arteries, and a rise of blood pressure due to its direct vaso-constrictor action on the blood-vessels. Ergotinine citrate probably depends for its action upon the ergotoxine it contains and presents no advantages over ernutine.

Liquor ergotæ ammoniatus, made with diluted ammoniated alcohol, is a very efficient preparation, and may be given if ernutine is not available in doses of a $\frac{1}{2}$ to 1 or 2 drachms three times a day. In cases where there is a good deal of pelvic congestion, such as occurs in some girls at puberty or when such congestion is produced or aggravated, as it undoubtedly sometimes is by long engagements, the addition of bromides to the ergot mixture is important; the following may be prescribed: R. Pot. Brom., gr. 20; Ernutine, $\mathfrak{m}30$; Tinct. Cinnamomi, $\mathfrak{m}30$; Aq., ad \mathfrak{zj} ; t.d.s. p.c. When it is necessary to continue the administration of one of the preparations of ergot for any length of time, it is well to combine it with strychnine or digitalis (for example, Extract. Ergotæ, gr. 3; Strychninæ Sulphatis, gr. $\frac{1}{30}$; Ft. Pil. 1 t.d.s. p.c.); while for hypodermic injection a combination of ergot and morphia is very useful in severe bleeding (Ergotin. Citrat. is,

gr. $\frac{1}{100}$; Morphine Sulphatis, gr. $\frac{1}{6}$), in the form of hypodermic tabloids. A pill of ergotine ($\frac{1}{2}$ gr.), with cannabin tannate ($\frac{1}{2}$ gr.), which is said to increase uterine contractions, and hydrochloride of hydrastinine ($\frac{1}{4}$ gr.), often acts very well. Another useful prescription is liq. ext. hydrastis Canadensis, liq. ergotæ ammoniatus or ernutine, of each $\frac{1}{2}$ drachm, and cinnamon water to 1 oz., three times a day.

Hydrastis Canadensis, or golden seal, is said to act on the vaso-motor nerves of the uterus without setting up uterine contractions, and to be of special value in cases of uterine congestion. It may be given as the liquid extract in doses of $\frac{1}{2}$ to 1 drachm or in the form of a pill containing $\frac{1}{2}$ gr. of the hydrochloride of hydrastinine. Both this drug and the next produce the best results when given about one week before the period comes on, and continued throughout the period.

Stypticine, cotarnine hydrochloride, and styptol, cotarnine phthalate, are among the most useful of all remedies in the arrest of hæmorrhage from the uterus. They are allied to hydrastinine and may be given in tablets containing $\frac{3}{4}$ gr. in each. They are especially indicated in cases where uterine contractions are not desired, since they act as sedatives to the nerves of the uterus and cause a fall in the blood pressure. They are useful in the class of case in which the uterus itself is healthy, as in the hæmorrhage of young girls at puberty or of women at the menopause; or in cases of hæmorrhage associated with disease of the appendages with uterine congestion. The sedative action of these drugs on the nervous system is also of advantage in relieving the pain when dysmenorrhœa is associated with excessive bleeding from the uterus.

Viburnum prunifolium (black haw) also may be given to arrest hæmorrhage, especially in cases of threatened abortion in early pregnancy. It exerts a sedative action on the uterus and may be prescribed in the form of the liquid extract in $\frac{1}{2}$ to 1-drachm doses.

It is a fortunate circumstance that hæmophilia does not, as a rule, affect the female members of a family, and that in the rare instances in which it does excessive bleeding at the menstrual periods is not common, although it may occur after childbirth and at the menopause. In such cases any one of the ordinary hæmostatic remedies is useless. Reliance must be placed on the administration of tablets of thymus gland in doses of 5 gr., three times a day, with the view of remedying directly the deficiency of leucocytes and indirectly the associated defective coagulability which characterises the blood

of the bleeder (Wright). For the purpose of directly arresting the hæmorrhage the intra-uterine application of Wright's physiological styptic, consisting of 1 part thymus to 10 parts normal saline solution, with .25 to .5 per cent. calcium chloride and 1 per cent. carbolic acid added, should be carried out by means of a Playfair's probe dressed with cotton-wool.

For the purpose of increasing the coagulability of the blood in bleeders, or in other cases where it appears to be deficient, calcium chloride or calcium lactate may be administered. As Almroth Wright and Paramore have shown that the best results are obtained if a mixture of calcium chloride or calcium lactate and magnesium lactate is given; a first dose of the mixture of 4 grammes (60 gr.) in all in the twenty-four hours should be given, and then to keep up the effect a further dose of 2 grammes (30 gr.) once a day.

Steaming the uterus is also applicable to these cases, and is not open to the usual objection to the use of strong escharotics, namely, that when the clot separates or is removed the bleeding occurs more severely than before. The intra-uterine position of the clot saves it from any injury, and, as a rule, before it separates there is sufficient time to improve the defective condition of the patient's blood.

A method of treatment which undoubtedly is very efficacious in desperate cases of uterine bleeding is the subcutaneous injection of a sterilised solution of gelatine. A sterilised 10 per cent. solution in normal saline is injected into the gluteal region in doses of from 15 to 50 cubic centimètres. It results in an increase of the fibrinogenous substances in the blood, and is certainly successful in arresting hæmorrhage. At the same time, this method of treatment is not free from dangers, and it is of the utmost importance that a sterile solution should be employed, for cases of tetanus have occurred as the result of using imperfectly sterilised solutions. This remedy, therefore, should not be employed except when all other means fail, and then only with the most careful precautions.

Aromatic sulphuric acid has long had a reputation for bringing about the arrest of bleeding from the uterus, but it is difficult to understand how it can do so, since, in the body it must become converted into one or other of its salts, which are valueless as hæmostatics. Gallic acid is also an old-fashioned remedy which still has its adherents; it may be combined with cinnamon, which is reputed to have a beneficial effect upon uterine hæmorrhage; thus, *R. Acid. Gallic.*, gr. 15; *Tinct. Cinnamomi*, ℥20; *Glycerini*, ℥20; *Aq.*, ad ʒj, t.d.s. p.c.

Hot Douches.—The action of heat in causing contraction of

unstriated muscle fibres is well known and the use of hot vaginal or intra-uterine douches in cases of severe hæmorrhage from the uterus is a very valuable therapeutic measure.

The douches should be given at a temperature of 115° to 116° F. for fifteen to twenty minutes at a time, a large quantity of fluid being employed, and the douche can be placed at but a slight elevation above the patient's body, so that the rate of flow may be slow. The patient always should assume the horizontal position, and the douches may be repeated every four to six hours, so as to ensure as far as possible a continuous contraction of the uterine muscle. Tincture of iodine or alum of the strength of 1 or 2 drachms [U.S.P. 20 or 40 min. tincture of iodine] to the pint, lysol in 1 per cent. solution, or a solution of adrenalin chloride in normal saline in a strength of 1 in 2,500 or 1 in 5,000, as recommended by Schäfer, may be employed.

If a good result is to be obtained, it is very necessary that the douches should be used in a proper manner and sufficiently often, since the poor results which sometimes attend this method of treatment are due largely to a failure in carrying it out properly. It is often impossible to employ an intra-uterine douche in the non-pregnant uterus, but, as in cases of severe hæmorrhage, the cervical canal is not uncommonly dilated to some extent, the use of a fine double channelled intra-uterine cannula may enable it to be done, or if necessary the cervix may be dilated first with Hegar's dilators under an anæsthetic.

Plugging the Vagina or Uterus.—In some cases of very severe hæmorrhage when medicinal measures fail, arrest of the bleeding can be secured by plugging the vagina or the cavity of the uterus. It is essential in either case that the plugging should be done thoroughly. In introducing a vaginal plug the patient is placed on her side or her back, a Sims' speculum passed to expose the vaginal fornices, and the vagina firmly and completely plugged with pledgets of some antiseptic wool or strips of antiseptic gauze. It is advantageous to smear the plugs with an antiseptic ointment, viz., boric acid ointment, as when thus treated not only are they easier to introduce, but they also form a more compact and impervious mass.

The plugging should be so thorough that no blood can escape through the plug. This treatment is painful, and it is advisable when it has to be carried out to give the patient a hypodermic injection of $\frac{1}{8}$ gr. of morphia. This has the added advantage of assisting to arrest the hæmorrhage. An even more certain hæmostatic result can be obtained by inserting a portion of the plug into the cervix when it is sufficiently dilated to admit of this

being done, or actually to plug the cavity of the uterus. In a non-pregnant patient this usually entails the preliminary dilatation of the cervical canal, when the opportunity can be seized of making sure that the bleeding is not due to anything in the uterine cavity, such as a fibroid polypus, which requires removal. The cervix having been seized with a volsellum, the interior of the uterus is firmly plugged with narrow strips of antiseptic gauze introduced by means of a pair of uterine dressing forceps. In some very severe cases of hæmorrhage occurring at the menopause this is the only certain method of arresting the bleeding.

Intra-uterine Applications.—Occasionally it may be possible and sufficient to swab out the interior of the uterus with some astringent; for this purpose tincture of iodine, tincture of hamamelis, iodised phenol (containing 1 part of iodine and 4 of liquefied phenol), equal parts of lysol and water, styptol, pure carbolic acid, adrenalin (1 in 5,000 solution), nitric acid, or Wright's physiological styptic, may all be employed (*see* p. 756).

They are applied by means of a Playfair's probe coated with a thin layer of cotton-wool and introduced through a Ferguson's speculum. The method has the disadvantage that unless the cervical canal is sufficiently patulous most of the solution is squeezed out of the cotton-wool during its passage through the cervix, and for this reason it is most useful after the cervical canal has been dilated and the interior of the uterus curetted. Care must be taken when one of the strong caustic solutions is used that all the excess of the fluid is mopped up before the speculum is withdrawn from the vagina. If this is done, any risk of burning the vulva is avoided.

When it is at hand, undoubtedly the best of these hæmostatics is either adrenalin or Wright's physiological styptic, and in cases of hæmophilia the last is the only preparation of any value.

Curettage.—In many cases where the primary cause of the uterine bleeding is some condition producing congestion of the uterus hypertrophy of the uterine mucosa results, and to arrest the menorrhagia accompanying this condition the best method is to curette the uterus and remove the unhealthy endometrium.

The patient must be prepared in the manner usual for an operation, and in all cases where pregnancy does not exist or has not existed recently, preliminary dilatation of the cervix should be carried out by means of a laminaria tent introduced into the cervical canal twelve hours before the time at which the operation is to be performed. A laminaria tent is rendered antiseptic readily by being kept in a saturated solution of iodoform in ether, and can, as a rule, be

introduced without much difficulty. The cervix is exposed by means of a duck-bill speculum and seized with a volsellum, and a tent of suitable size is then passed into the cervical canal by means of a pair of long Spencer Wells' forceps, care being taken that it passes through the internal os, and a plug is then put into the vagina below the tent to keep it in its place. It is important that no force should be used and it is better not to give an anæsthetic, so that the occurrence of pain may warn the operator that possibly a wrong direction is being given to the tent. A tent of suitable size should pass through the cervix without causing any undue pain. At the time of the operation the patient under the anæsthetic is placed in the lithotomy position and the tent removed. The vagina is then douched out with a 1 per cent. solution of lysol, and the vulvar hair, if this has not been done already, is shaved. A careful bi-manual examination is now made to ascertain the exact condition of the appendages, an Auvar's weighted speculum placed in position, and the anterior lip of the cervix seized with a volsellum. If necessary, the cervix is dilated further with Hegar's metal dilators and the uterus curetted. In order to obtain a piece of tissue suitable for microscopic examination, which should be carried out in every case of curetting, the curette is drawn in one sweep first along the anterior and then along the posterior wall of the uterus from the fundus to the internal os. The pieces of tissue thus obtained are floated off in sterile water and subsequently hardened and examined. In cases where there is any suspicion as to the condition of the cervix a separate scraping should be taken of this portion of the uterus. The whole of the interior of the uterine cavity is scraped systematically and tincture of iodine or some similar antiseptic applied by means of a layer of cotton-wool rolled round a pair of uterine forceps. A further vaginal lysol douche and the insertion of an iodoform gauze plug into the vagina, to be taken out at the end of twenty-four hours, complete the operation. It is best to employ a sharp curette, as the careful use of this instrument is not attended with any danger of perforating the uterus so long as it is not used in septic cases, and it enables the mucous membrane to be removed with greater certainty and with the employment of less force.

In cases where there are any signs of inflammation of the uterine appendages the operation of curettage should not be performed until the acute stage has passed off, and special care must be taken in such a case not to pull down the uterus forcibly, so as to avoid the danger of breaking down adhesions or of rupturing a distended tube or a cystic ovary.

Steaming the Uterus.—The operation of steaming the uterus is applicable to cases of severe bleeding occurring at the menopause, and, when used in conjunction with the medicinal methods already described, to cases of hæmorrhage due to hæmophilia. It may be employed also in cases of so-called fibrosis of the uterus before resorting to the severe measure of hysterectomy.

In order that it may prove successful and be free from danger it is necessary to observe certain precautions in carrying it out. The pelvic organs must be examined carefully to make certain that there is no sign of any recent or old attack of pelvic peritonitis present, which forms a complete contra-indication to the operation. To prevent the risk of cicatrisation and contraction of the cervical canal and the occurrence of dysmenorrhœa it is necessary to dilate the canal to a sufficient extent. This is best done by the introduction of a laminaria tent sterilised by having been kept in a saturated solution of iodoform in ether. The tent is kept in some twelve hours or so, and then the cervix, if necessary, is dilated with Hegar's dilators to such a degree as to admit the intra-uterine tube used in the operation without any difficulty.

It is possible, but not advisable, to perform the operation without an anæsthetic. The patient under anæsthesia, therefore, is placed in the lithotomy position and a careful bi-manual examination carried out to make certain that there is no disease of the uterine adnexæ. The buttocks are covered with a large piece of lint or gauze soaked in some cold antiseptic lotion, in which a hole just large enough to expose the vulvar opening has been cut. An Auvards' weighted or Sims' speculum is placed in the vagina and the cervix drawn down to the vulva with a volsellum. The danger of burning the vagina and vulva is minimised if a wooden speculum is employed, but this is rather less convenient than a weighted metal one.

In any case where there is the suspicion of the presence of malignant disease a small portion of the uterine mucosa from the cervix and body respectively should be removed with a curette and placed on one side for further examination. The slight hæmorrhage which results should be arrested by an intra-uterine douche of a 3 per cent. solution of peroxide of hydrogen at a temperature of 115° F. If it is certain that there is no malignant disease present, it is better not to curette the uterus before steaming it.

It is imperative that the special apparatus required for the operation, consisting of a small boiler heated by a spirit lamp, furnished with a thermometer and a safety valve, and capable of withstanding the pressure of superheated steam at 120° C., should be in perfect

working order. In all cases it should be tested beforehand in order to make sure that it does not leak, that the safety valve is working properly, and that there is no obstruction in the tubing or on the double channelled cannula used for the intra-uterine application of the superheated steam. The cannula is provided with a three-way cock which permits of the steam being shut off, passing through the cannula, or escaping to the outer air through a second tube in case it is desired to lower the pressure in the boiler.

Before introducing the cannula into the uterus the steam should be turned on and allowed to pass through it for a few seconds so as to get rid of any condensed water and to sterilise the interior of the instrument. The cannula should be carefully cleansed after each occasion of using it, and boiled before it is employed again. The length of the uterus is measured with a sound and the cannula, with the steam turned off, is introduced up to the fundus and then withdrawn for $\frac{1}{3}$ to $\frac{1}{2}$ inch. The three-way cock is then so turned that the steam can pass into the interior of the uterus, and the length of the application is measured from the moment at which steam is first seen to escape from the outer return tube of the cannula. During the application of the steam a cold solution of boric acid or some similar weak antiseptic lotion is allowed to flow over the piece of lint protecting the buttocks, the vaginal walls and the speculum, care being taken not to allow it to flow over the cannula. The length of time during which the application of the steam is made, varies in different cases from five to fifteen seconds in small uteri, which contract well, to twenty to forty seconds in large, bulky, flabby uteri. The best results are obtained from the use of steam at a high temperature, viz., 110° to 115° C., for as short a time as possible. In most instances the application of the steam is followed by a definite and appreciable contraction of the uterine muscle, and the better marked this contraction is, the shorter according to Pincus, should be the duration of the application. The intra-uterine cannula may be cautiously moved about, but should not be pressed against the fundus. The steam must be turned off before the cannula is withdrawn from the interior of the uterus. In some cases the best results are obtained by the repetition of the steaming at an interval of three to four weeks, or after the next monthly period. The after-treatment consists in keeping the patient in bed for a week or ten days.

The operation, when carried out in suitable cases and with proper precautions, is almost free from any immediate risk; great care is, however, necessary not to allow the steam to act upon the cervical

canal, as this is apt to be followed by cicatricial contraction, and cases have occurred of very severe dysmenorrhœa and hæmatometra following the operation, even necessitating hysterectomy. The cervix is best protected from any damage by taking care that it is sufficiently dilated and by ensuring that no part of the metal cannula, which is not covered by the non-conducting cellular covering, comes in contact with it.

Electrical Treatment.—The intra-uterine application of electricity in the treatment of hæmorrhage from the uterus, as originally recommended by Apostoli, has been given up almost entirely. The results obtained by its employment are not better than those resulting from the operation of curetting or the intra-uterine applications of astringents, measures which are carried out more easily, and which can be practised without any special apparatus. We do not therefore recommend the use of electricity in the routine treatment of hæmorrhage from the uterus, but since its employment has been advocated again recently, and as occasionally it may obviate the necessity for a more radical operation, a short description may be given of the manner in which it is best carried out in such cases. The galvanic current is most commonly employed, although in some cases the faradic current, or the electro-chemical, "ionic method," is used. The application of the former is made by means of a spiral platinum electrode introduced within the uterus, or, better, by means of a zinc electrode, as recommended by Betton Massey. This, after sterilisation by heat, is amalgamated by being dipped into a 10 per cent. solution of sulphuric acid and then into metallic mercury, the result being the production of a bright, smooth surface which renders its insertion easy (Massey).

The indifferent kaolin pad electrode is placed on the abdomen and the intra-uterine sound introduced up to the fundus, care being taken that the insulated portion reaches beyond the internal os. The negative pole is attached to the abdominal clay pad and the positive to the intra-uterine electrode. The strength of the current should not be greater at first than 20 milliampères, but it may be raised gradually to as much as 35 to 50 milliampères, or even more. The application should be continued, as recommended by Apostoli, for five minutes at a time. It may be repeated twice weekly, but must be omitted during the menstrual periods. If there are any abrasions or pimples on the abdomen, they should be protected by covering them with a piece of paper smeared with boracic acid ointment. The occurrence of pain is an indication to lower the strength of the current. It is a wise precaution for the patient to rest for a time after the applications, and in cases where strong

currents are employed she should remain in bed for twenty-four hours.

This method should not be used in cases where there is any sign of acute or chronic inflammation of any of the pelvic organs, and the number of the applications must be regulated by the severity of the case and the effect produced.

In order to avoid the risk of introducing any septic organisms into the uterus the vagina should be swabbed out with an antiseptic lotion before the intra-uterine electrode is introduced.

In properly selected cases the method is free from risk and is suitable for use in cases of severe bleeding where a radical operation is contra-indicated by the patient's general condition.

Oöphorectomy.—The operation of oöphorectomy, which at one time was practised in cases of uncontrollable uterine hæmorrhage, should no longer be performed, since in the cases where such an operation is required it is better to remove the uterus and to leave the ovaries, so avoiding the production of an artificial menopause.

Hysterectomy.—In the cases where the hæmorrhage is so severe as to imperil the patient's life, although no evident signs of disease may be present, as, for instance, in some cases of so-called fibrosis of the uterus, removal of that organ may be called for. This may be carried out either by the vaginal or by the abdominal route. As a general rule, it is an advantage to leave the cervix when it is certain that there is no evidence of any malignant disease being present. For this reason supra-vaginal abdominal hysterectomy should be performed in preference to vaginal or abdominal total hysterectomy. In a very fat or feeble patient the vaginal operation may be indicated as involving less danger and shock, and in all instances, unless certainly diseased, the ovaries should be preserved. In the cases, however, in which other treatment fails and hysterectomy appears to be necessitated by the severity of the bleeding, a trial should be given to steaming the uterus if this has not already been done, as it is precisely in such a case that this operation is indicated.

Hæmorrhage at the period of the menopause is seldom so severe as to call for the removal of the uterus, and it must be remembered that in the great majority of cases the bleeding ultimately ceases quite apart from any treatment, and therefore it is of great importance not to resort to such a severe measure as removal of the uterus unnecessarily. The fact that many of these uteri exhibit a marked degree of so-called fibrosis with a considerable increase in the amount of white and yellow connective tissue in their walls, has led some writers to take an altogether exaggerated view of the

importance of this change and of its relation to the excessive hæmorrhages so common at the menopause, since the causal relationship between the two is very far from being proved certainly.

G. BLACKER.

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DISEASES AND AFFECTIONS OF THE OVARIES.

ABSCCESS OF THE OVARY.

OVARIAN ABSCESS, apart from pyosalpinx, is not very common, and when it does occur is usually diagnosed as pyosalpinx. The pus in ovarian abscesses is specially liable to contain virulent organisms, so the greatest care is necessary in separating adhesions, and packing off the abdominal cavity is essential in case the abscess wall should give way during the operation. Fortunately the wall of an ovarian abscess is often thick and tough.

H. RUSSELL ANDREWS.

CHRONIC OVARIAN PAIN.

MANY young women, even at the present day, are subjected to removal of an ovary, because they complain of aching in the region of one of the ovaries. The immediate result is often most satisfactory, because the patient is kept in bed for two or three weeks and attention is paid to the bowels, sleep, etc., but the permanent result is seldom good. It must be remembered that pain in the ovarian region does not necessarily point to disease of the ovary any more than supra-orbital neuralgia points to disease of the eye. A movable ovary of normal size should never be removed simply because it aches. Chronic constipation is the cause of much "ovarian pain." The patient's general condition should be treated by attention to the teeth and digestion, if necessary, regulation of the bowels, administration of iron, exercise or massage, fresh air, etc. If the patient is sleeping badly this must be corrected. In some cases a good deal can be done by persuading the patient to take up some occupation. As a rule it is important to avoid local treatment, and the patient should never be told that an ovary is responsible for her pain. Counter-irritation, a mustard-leaf or blister, is often efficacious. In some cases there seems to be no doubt that incomplete intercourse is the cause of the aching, and advice on this point may be followed by good results. A varicose condition of the ovarian veins in the broad ligament, especially on the left side, sometimes called ovarian varicocele, is held by some operators to be one of the causes of "ovarian pain." If bi-manual examination reveals the presence of large varicose veins in the broad ligament, it would be better to ligature these than to remove the ovary.

H. RUSSELL ANDREWS.

HERNIA OF THE OVARY.

HERNIA of the ovary, which is much more commonly inguinal than femoral, may be congenital or acquired, and is not infrequently associated with some degree of mal-development of the uterus, or pseudo-hermaphroditism.

It is more often congenital, and then is frequently bi-lateral.

In acquired hernia of the ovary the sac may contain also intestine or omentum, and sometimes part of the uterus.

The condition may cause trouble in early infancy, from torsion of the ovary, which may be accompanied by acute symptoms, pain and vomiting, or by very little disturbance in spite of acute torsion.

The hernia may not be noticed until puberty, or until enlargement of the swelling occurs as a result of tumour formation in the ovary or suppuration.

If it is noticed in infancy it is probably because torsion of the ovary has occurred. There may be only evidence of tenderness of the swelling in the groin, or there may be vomiting and pain, as shown by the infant drawing up its legs, crying, etc. The diagnosis is probably made only after the ovary and tube have been laid bare by an incision, but the presence of double congenital inguinal hernia in a female infant should rouse suspicion that the herniæ contain the ovaries. Even in the absence of severe symptoms the sac may be found to contain blood-stained fluid, and the ovary and tube may be deeply congested. The ovary is usually found lying in front of the tube. Removal is generally advised, as it is difficult to prevent risk of recurrence of the torsion without opening the abdomen if the ovary and tube are replaced in the abdominal cavity.

When symptoms occur later on an attempt should be made to reduce the hernia, under an anæsthetic if necessary, unless the ovary is certainly diseased, in which case it should be removed. Attempts at reduction are unlikely to be successful except in the case of acquired hernia.

If attempts at reduction fail, and there are no signs of strangulation, an apparatus may be worn with a hollow pad to protect the ovary from pressure, but an operation is more likely to produce a satisfactory result. The ovary and tube may be returned to the abdomen after separation of adhesions, or removed if diseased or so highly strangulated that their return would be dangerous.

H. RUSSELL ANDREWS.

INTRA-LIGAMENTARY TUMOURS.

BROAD-LIGAMENT TUMOURS, par-ovarian and others, may be divided into two groups, in one of which the tumour is contained in the mesosalpinx, while in the other the tumour occupies the mesometrium (Fig. 1).



FIG. 1.—A cyst in the mesosalpinx.

If the tumour is situated entirely or chiefly in the mesosalpinx, the mesometrium forms a pedicle on which the tumour can move about, and this pedicle can be ligatured and divided in the ordinary way, the ovary itself being left behind in some cases. If, on the other hand, the tumour is situated on the floor of the pelvis, between the layers of the deep part of the broad ligament, it is impossible to secure a pedicle, and the tumour must be shelled out (Fig. 2). In some cases the tumour can be shelled out with

ease and rapidity, while in others it is practically impossible to remove the tumour with safety unless the uterus is removed as well. In a simple case a longitudinal incision is made through the peritoneum behind and below the Fallopian tube, the edges are held with pressure-forceps, and the cyst is shelled out from its peritoneal covering by separation with the fingers, aided occasionally by a few touches with the knife or snips with a pair of scissors. A cyst should be removed whole if possible, but if very large it may be best to empty it and then to insert one or two fingers or the whole

hand into the interior of the cyst to render the task of the other hand in effecting the separation more easy by defining the limits of the cyst. An inflamed cyst may be found to be so closely connected with the ureter and iliac vessels that very cautious separation is required. After removal of the tumour bleeding points in its bed are ligatured, redundant peritoneum is removed, and the cavity is closed by suture of the edges of the peritoneum. Each case must be judged on its own merits, the operator trying to strike the happy mean between leaving too large a cavity and removing so much peritoneum that the resulting contraction results in tension. In rare instances the oozing from the raw surface of the bed of the tumour may be so great that it cannot be checked by ligature and under-stitching. In such a case it is best to pack the cavity with gauze, sew up the upper part of the cavity, and bring the end of the gauze out by an opening into the vagina. In one case of my own, a left-sided broad-ligament cyst extended up behind the parietal peritoneum as high as the kidney, the pelvic cavity being filled by a uterine fibroid. In such a case as this it is wise to drain the cavity by the vagina for a few days. When the tumour is small, ligature of the ovarian vessels may be unnecessary, and the ovary and Fallopian tube may be left behind, if healthy.

In the case of an inflamed cyst or solid tumour burrowing down deeply into the broad ligament the easiest and safest method may be to remove the uterus first and then to deal with the deep connections of the tumour, the rectum and the neighbourhood of the ureter and iliac vessels, from below rather than from above. Should the healthy condition of the ovary and tube on the other side, and the fact that the patient has not reached the time of the menopause contra-indicate removal of the uterus, it may be possible by thorough separation of the tumour from the uterus at an early stage of the

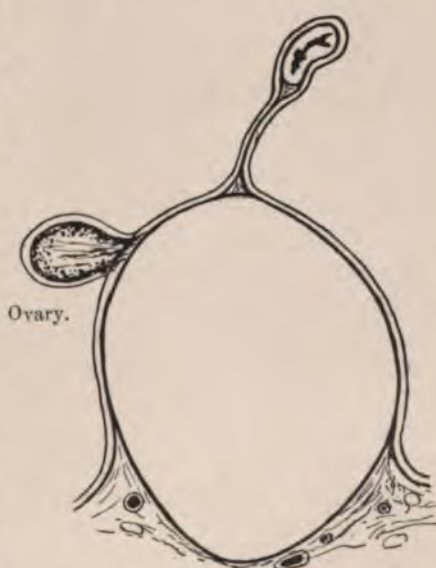


FIG. 2.—A cyst burrowing deeply into the mesometrium.

operation to pull the uterus to one side out of the way, and to work from below in separating the tumour from the dangerous area in the pelvis.

H. RUSSELL ANDREWS.

MALIGNANT OVARIAN TUMOURS.

IN cases of malignant ovarian tumours where there is evidence of extension to the anterior abdominal wall or of secondary growths in the liver or elsewhere, operation is contra-indicated except for relief of pressure symptoms from ascites. Fixation of the tumour in the pelvis is not necessarily a contra-indication to operation; the fixation may be due to the shape, size and position of the tumour, and not to malignant infiltration of the pelvic wall. An exploratory operation is often worth while. An incision about 2 inches long will allow of escape of the ascitic fluid and of insertion of one or two fingers which can investigate the condition of the interior of the abdomen. If there is evidence of secondary growths in the intestine, omentum or parietal peritoneum other than small papillomata, the abdomen should be closed at once; but frequently the condition of the abdominal cavity is found to be better than was anticipated, and the tumour can be removed with good results, both immediate and remote. Partial removal of malignant ovarian tumours, or much disturbance without removal, gives very bad results, death from exhaustion and toxæmia being likely to occur within a few days. Removal of the ascitic fluid without disturbance of the growth may give great temporary relief. The frequent association of a primary growth in the stomach with secondary ovarian growth must always be remembered, and an examination of the stomach should be made at the time of removal of a malignant ovarian tumour. If there is extension of a malignant ovarian tumour to the intestine, without evidence of secondary metastatic growths, it may be advisable to resect the affected portion of the bowel and to remove it with the tumour, as has been done in several cases with success. Removal of the uterus and the other ovary is to be advised when there is strong evidence that an ovarian tumour is malignant, if the patient is middle-aged.

H. RUSSELL ANDREWS.

OVARIAN TUMOURS DISCOVERED DURING PREGNANCY.

DURING the first half of pregnancy an ovarian tumour should be removed as soon as it is found, whether causing symptoms or not. Twisting of the pedicle is common during the first half of pregnancy, and is likely to cause miscarriage, while ovariectomy during this period does not often disturb the pregnancy.

During the last two or three months there is more likelihood of premature expulsion of the ovum being brought on by ovariectomy, and at this stage of pregnancy the accident of twisting of the ovarian pedicle is less likely to occur than in the earlier months. Nevertheless, there is considerable risk of accidents to the tumour, and most operators refuse to allow that the fact that the second half of pregnancy has been reached furnishes an exception to the rule that an ovarian tumour should always be removed as soon as it is found. Some authorities, however, prefer to keep the patient under observation and postpone operation, unless urgent symptoms arise, until a time when there is a very good prospect of the child surviving if premature labour follows the operation. There is sometimes an interval of a week or two between the ovariectomy and the onset of premature labour.

When ovariectomy is performed during pregnancy, special precautions must be taken with a view to avoiding disturbance of the uterus as much as possible. A hypodermic injection of morphia is given half-an-hour before the operation. During the operation the uterus, if it is exposed, is protected by warm towels and handled and disturbed as little as possible, while the Fallopian tube is left behind, if this can be done safely. If the tumour is situated low down, pressure from below by an assistant's fingers in the vagina will allow of the tumour being removed with less disturbance to the uterus than would be caused by the operator forcing his hand down between the uterus and the pelvic wall, and may do away with the necessity of making a large incision and pulling the upper part of the uterus out of the abdomen before the tumour can be lifted out of the pelvis. A morphia suppository should be given after the operation to diminish the risk of abortion or premature labour, and if the uterus shows signs of having been irritated, morphia may be repeated for a day or two, laxatives being

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given by the mouth to prevent constipation and the consequent need of enemata. Administration of saline solution per rectum will also lessen the tendency to constipation.

An exception to the rule that all ovarian tumours ought to be removed is found when small ovarian tumours accompany cases of vesicular mole. These polycystic lutein tumours, usually about the size of a goose's egg or a little larger, should not be removed unless there are symptoms pointing to torsion of the pedicle, suppuration, etc. In the course of a few months these tumours become diminished in size fairly rapidly, until the ovaries have gone back to their original size.

H. RUSSELL ANDREWS.

OVARIAN TUMOURS DISCOVERED DURING LABOUR.

THE tumour may be abdominal in position and cause no trouble during labour. In this case there is no need to interfere immediately, but as twisting of the pedicle is likely to occur during the puerperium, the best treatment is to remove the tumour a few days after labour, whether urgent symptoms are present or not. If the labour has been easy and the patient's condition is good, there is no need to wait; but if the labour has been long and exhausting, it may be well to wait for a week before operating.

When the tumour is pelvic in position it may interfere with the labour, even to the extent of causing insuperable obstruction. In the past there were three methods of dealing with such tumours: (1) Pushing up the tumour out of the pelvis; (2) tapping it *per vaginam*, if it were cystic; and (3) dragging the child past the obstruction, the head being perforated if necessary. The last method has ended in disaster in many cases.

The ideal treatment is to open the abdomen, remove the obstructing tumour, and leave delivery to nature; but in some circumstances this procedure would be impossible. If labour is so far advanced when the patient is first seen that delay would lead to risk of rupture of the uterus, and no adequate assistance is available, it would be too much to expect that the accoucheur should perform ovariectomy single-handed. In such circumstances no hard-and-fast rule of treatment can be laid down. It may be possible to push the tumour up into the abdomen so as to allow of natural delivery. If so, arrangements must be made for removal of the tumour as soon as possible after labour. If the tumour cannot be pushed up it should be tapped through the vaginal wall, if it appears to be a thin-walled cyst, and the collapsed cyst should be removed as soon after as is possible. Vaginal ovariectomy in such circumstances, at the time, would be practically out of the question. If the tumour is solid or appears to be dermoid, not only would no advantage be gained by tapping, but actual harm might be done, and here perforation, craniotomy, and, if necessary, extensive embryotomy would in the circumstances be the best treatment, followed again by removal of the tumour as soon as possible. When the foetus has been dragged past the obstructing tumour, a

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method of treatment which could be successful only in cases where the tumour was very small, bruising of the latter followed by suppuration is a very likely result. Fortunately, at the present day, a combination of circumstances rendering it impossible to obtain adequate assistance is rare. Such cases as those that we are considering serve to emphasise the importance of a routine examination during the last few weeks of pregnancy.

The ideal treatment, as I said above, is to open the abdomen, remove the tumour, having dislodged it from the pelvis by pulling from above and pushing from below, and then to close the abdomen and leave delivery to nature. It is seldom necessary to perform Cæsarean section unless the tumour is malignant and fixed by invasion of surrounding tissues, or an inflamed cyst fixed by old adhesions, neither of which conditions is likely to be met with in a case of advanced pregnancy.

H. RUSSELL ANDREWS.

OVARIAN TUMOURS DISCOVERED DURING THE PUERPERIUM.

THE fact that a patient has got through her labour safely, although there is an ovarian tumour in the abdomen, does not justify neglect of the tumour. Twisting of the pedicle with its numerous ill-effects is common during labour and the puerperium, and is responsible for some cases which are diagnosed as "puerperal fever." Recognition of the fact that pyrexia and symptoms of sepsis during the puerperium are due to the presence of an inflamed or suppurating ovarian cyst may be very difficult without an anæsthetic, and careful bi-manual examination under anæsthesia is essential in obscure cases of puerperal sepsis.

An ovarian tumour discovered during the puerperium should be removed as soon as possible, whether causing symptoms or not. If there are no adverse symptoms there is no object in waiting, and the total time that the patient has to spend in bed will be shortened if she convalesces from her labour and ovariectomy at the same time. If the tumour is causing trouble, the sooner it is removed the better are the chances of the patient's recovery.

H. RUSSELL ANDREWS.

OVARIOTOMY.

Preparation of the Patient.—Some ovariectomies have to be performed almost at a moment's notice, but in the majority of cases there is time for a thorough preparation of the patient.

The Bowels.—A purgative is given on the night but one before the operation, and repeated if necessary on the night before the operation. Any purgative that the patient is in the habit of taking will do. Early on the morning of the operation a simple enema of soap and water is given.

There is no need to starve the patient, but nothing should be given by the mouth for five hours before the operation. If she is thirsty, she may wash her mouth out, but should be warned that if she drinks anything she will not take the anæsthetic so well, and will be more likely to suffer from vomiting afterwards.

The Skin.—The patient is given a bath the night before the operation, and the abdomen is thoroughly washed with soap and water, special attention being paid to the umbilicus, and the pubic hair is shaved off.

Many operators prefer the patient's abdomen to be compressed for some hours before the operation. Personally I never use compresses. They make the epithelium sodden: if the antiseptic used is strong it irritates the skin, and if weak it does no good.

If no compress is used the skin of the abdomen is prepared as soon as the patient is anæsthetised, being washed with soap and water, and then with turpentine, which removes grease. Turpentine is better than ether for this purpose, as it does not cause so much loss of heat by evaporation. After the turpentine has been wiped off, the skin is washed with a solution of biniodide of mercury in methylated spirit (1 in 500), and then with a watery solution of biniodide or perchloride of mercury. Packing material, sterilised cotton-wool or towels, is pushed under the flanks while the abdomen is being washed to prevent any of the turpentine or spirit solution from running underneath the patient. If this precaution is not taken and the washing is done carelessly, the skin of the back may be burnt.

The quickest method of preparing the skin is with iodine and rectified spirit, a 2 per cent. solution. The skin of the abdomen is shaved dry, and then is painted with this solution about twelve hours

before the operation and again just before the operation, as soon as the patient is anæsthetised. The skin must not be washed during the twelve hours preceding the painting. I have found a single painting at the time of the operation perfectly successful in emergency operations for tumours with twisted pedicles, and have given up the laborious method of preparation described above.

In emergency cases the skin of the abdomen may be painted with the iodine solution again at the end of the operation.

If there is any likelihood of drainage by the vagina being needed, the vagina is prepared by a thorough cleansing with soap solution, biniodide of mercury in spirit, and a watery solution of biniodide or perchloride of mercury, by swabs held in sponge-holders if necessary. The patient wears thick woollen stockings, or cotton-wool bandaged from her feet to her thighs, and a warm woollen vest under her night-dress. When she is anæsthetised her legs and thighs are wrapped in a blanket covered by a mackintosh, and another mackintosh is placed over her chest.

Her arms are laid along her sides, fixed in position by a towel which goes under her back. This is more satisfactory than pinning her sleeves to her nightgown or to the pillow. If the arms are allowed to hang loose they may get in the way of the operator, and, if the raised-pelvis position is used, may hang down and become paralysed by pressure against the edge of the table.

Instruments.—The instruments necessary for ovariectomy are :

Twelve pairs of small pressure forceps (a smaller number is usually sufficient, but it is convenient to have a large supply); two pairs of large pressure forceps, about 8 inches in length; a scalpel; a blunt-pointed bistoury; two pairs of scissors, one curved and the other straight; a pair of dissecting-forceps; two pairs of sponge-holders; a pair of retractors; curved needles; straight needles; a needle-holder; a pedicle needle (an aneurysm needle, about 6 inches long, does very well: there is no need for one of the long clumsy instruments sold as "pedicle needles:" a sharp-pointed pedicle needle is unnecessary in most cases, and is dangerous); trochar and tubing (this will not be used in the majority of cases); drainage-tubing (this, again, will not be used in the majority of cases).

Sutures and Ligatures.—Silkworm-gut, catgut and silk, etc., may be used. I use:

(1) Silkworm-gut of two sizes, one moderately thick for the sutures which go through all the structures of the abdominal wall except the peritoneum, and the other, thin, for the superficial sutures. There is no need to use the very thick silkworm-gut, which is three

times as expensive as the next size. I do not use silkworm-gut sutures unless the patient is very fat.

(2) Chromicised catgut of two or three sizes, the thickest for ligature of large vessels and for suture of the aponeurosis, the thinner for ligature of small vessels and suture of peritoneum, etc. Chromicised catgut is, in my opinion, the best material for ligatures and for buried sutures.

(3) Fine silk, for suture of intestine in case of injury too severe to be treated by simple suture of the tear, may be added with advantage.

The operation of ovariectomy can be performed with one assistant; but if the patient is stout, or strains and takes the anæsthetic badly, or if the operation is difficult on account of adhesions, etc., the operator will be much more comfortable and operate more rapidly if he has at least two assistants, one of whom threads needles, hands him ligatures, etc., while the other stands opposite the operator and devotes the whole of his attention to the operation. In difficult cases a third assistant may be very useful.

The raised-pelvis position is to be recommended, except in the case of suppurating cysts and of very large tumours. If the patient is fat, and if she strains, it is a difficult and tedious matter to explore the pelvis, stop oozing, etc., when she is lying flat, even when the intestines have been packed away as much as possible by gauze swabs. With the raised-pelvis position it is often unnecessary to insert any swabs into the abdominal cavity. Some operators prefer to open the abdomen before the pelvis is raised, because, in the latter position, the peritoneum tends to sag away from the rest of the anterior abdominal wall, but the inconvenience resulting from this is very slight. Where there is plenty of assistance, as in a hospital or nursing home, there is no objection to having the table tilted after the operation has been begun, but if the operator or his assistant has to take any part in altering the position of the patient there is a risk of sepsis being jeopardised.

Unless the patient is anæsthetised in a separate room, the instruments, after being boiled, should be placed in the dishes, covered with sterilised towels, before the commencement of the anæsthetic. The anæsthetist is hampered in his work if the patient is disturbed by the rattling of instruments or by talking. The instruments and ligatures are placed on a sterilised towel, in sterile saline solution, or in a weak (1 in 60) carbolic-acid solution, according to the taste of the operator. If the skin of the abdomen has been prepared by the iodine method, it is best to have the instruments laid on a dry sterilised towel. During the operation each instrument, when it is

laid aside after being used, is rinsed in boiled water and then put back in its place in the dish, the instruments being arranged in a certain order so that the operator can put his hand quickly on any instrument that he wants.

The operator and his assistants should begin to prepare their hands before the commencement of the anæsthetic, so that the patient shall not be kept under anæsthesia any longer than is necessary. As soon as the patient is anæsthetised one of the assistants completes the preparation of the skin of the abdomen, while the operator threads needles, unless he has a special assistant to do this for him. When the preparation of the skin is complete, the operator arranges the sterilised towels, while the assistant who has cleaned the skin completes the preparation of his own hands and puts on his gloves. The simplest arrangement of towels is to have a large towel measuring 5 feet by 4 feet, with a hole 8 inches by 6. This covers the patient from her neck to her feet. It is well to have small towels in readiness to cover up part of the large towel if it becomes much soiled.

An incision is made in the middle line from a point 3 inches below the umbilicus to one about 1 inch above the symphysis pubis down to and then through the aponeurosis. Bleeding points are picked up by pressure forceps. The space between the recti is then sought for, and the soft tissue between the two muscles incised until the peritoneum is reached. Some operators prefer to avoid the middle line, and make their incision at the outer border of one of the recti, turning the muscle inwards. Any unusual condition of the peritoneum must be noticed before it is incised: the bladder may reach unusually high up, bowel may be adherent in the line of the incision, or the tumour may be adherent to the anterior abdominal wall. An cedematous, infiltrated appearance of the sub-peritoneal tissue suggests adhesion to the bowel or to the tumour. In such a case, and in that of upward displacement of the bladder the incision must be prolonged upwards until a spot is found where the peritoneum appears to be normal. The peritoneum is picked up with dissecting forceps and incised with the knife held with the flat of the blade towards the abdomen. In case of doubt as to whether the peritoneum is free or not, it is well to incise it cautiously between two pairs of pressure forceps. The urachus is a useful guide.

When the peritoneum has been opened a finger is inserted and the wound is enlarged in both directions, as far as is necessary, by a blunt-pointed bistoury. The bistoury is safer than a scalpel or pair of scissors, especially if the patient strains. A gauze swab is

inserted, if necessary, to pack the intestines out of the way, or to protect the upper part of the peritoneal cavity. The tumour is inspected and the hand is inserted into the abdomen so that the presence or absence of adhesions can be ascertained. After dealing with any adhesions that may be found the tumour is brought up out of the wound and its connections are ligatured and divided. (The question of tapping a cyst, the treatment of adhesions, and the method of tying the pedicle will be considered later.) The other ovary is then examined and dealt with as may be necessary, the peritoneal cavity is swabbed out if there is any blood or other fluid in it, the forceps and swabs are counted, the omentum is placed in its normal position, and the abdomen is closed.

The Other Ovary.—After removal of an ovarian tumour the condition of the other ovary should always be inspected, and in a multiparous woman or woman of middle age it should be removed if it shows any marked signs of cystic change. In a younger woman, particularly if only recently married, or about to be married, the patient should, if possible, be given a chance of becoming a mother, even if she has to have another ovariectomy performed in a few years' time. The conservative treatment of small ovarian tumours by re-section, *i.e.*, removal by a wedge-shaped incision of the part which is evidently diseased and leaving the peritoneal part, is not very satisfactory. It is only too likely that, although the immediate result is good, ovariectomy will be called for subsequently, but it is worth trying in a case where there seems to be a chance of pregnancy. The cystic part is removed by a V-shaped incision, and the two sides of the V are united by suture. The bleeding is trifling as a rule, but one or two small vessels may require to be ligatured before the suture is inserted. It is sometimes possible to remove a cyst, even one as large as an ordinary orange, and leave a practically normal ovary. Fibroid tumours may be shelled out, and it is said that dermoid tumours may be treated in the same way, but I have not met with such a case. After removal of a malignant tumour the other ovary and the uterus should be removed.

Removal of a healthy ovary in a young woman because the other ovary was cystic has been recommended, but is to be deprecated strongly. After removal of both ovaries some authorities advise removal of the uterus in all cases, but I should not remove the uterus unless it was diseased or its removal made the operation of ovariectomy safer.

Should the other ovary, if healthy, be removed after removal of a papillomatous ovarian tumour? There is some difference of opinion

about this. If the patient is middle-aged, removal of the other ovary and the uterus is to be advised, but this drastic procedure is not to be recommended in the case of a young woman. Several cases have been recorded of patients remaining in good health for many years and bearing children after removal of a papillomatous ovarian tumour. In cases of doubt as to whether the other ovary is healthy or not, Gottschalk advises that it be split, for purposes of examination. If it proves to be healthy, it is sewn up with catgut and left in its place.

Adhesions.—Adhesions may be met with between the tumour and the anterior abdominal wall, the omentum, intestine, the bladder, uterus, and pelvic peritoneum, and may vary from loose, soft membrane to dense, hard, fibrous tissue or intimate juxtaposition with no intervening fibrous tissue. The most common adhesions, those between the tumour and the omentum, can as a rule be dealt with without difficulty. If the adhesion is soft, it can be separated by pressure with the finger-tips or with gauze swabs; if more dense, the omentum must be ligatured in small bundles and cut through. Ligature of a large mass of omentum gives rise to danger of hæmorrhage occurring some hours later from slipping of the ligature. It is not wise to leave long, narrow bands of omentum after extensive separation, as such bands might cause internal strangulation of the intestine later on. They should be removed after ligature of their bases, and holes in the omentum should be sutured for the same reason. A good deal of force can be used in separating adhesions between the tumour and the anterior abdominal wall, provided that the tumour is not a cyst filled with pus. In some cases it is necessary to use a knife or pair of scissors, but as a rule the tumour can be separated from the anterior abdominal wall by pressure or pulling with the fingers.

Adhesions between intestine and the tumour require very careful treatment. If they are thin and membranous, a few touches with the knife will enable a separation to be made, but sometimes the gut is in actual contact with the tumour, no membrane intervening. If force is used to effect a separation in such a case, there is a danger of tearing the intestine, or at least of tearing off the peritoneal coat and leaving the muscular coat bare. In the majority of cases, if care is taken, there is little danger of wounding adherent intestine, but sometimes when adhesions round a small tumour are of old standing, and particularly when suppuration has occurred after a former operation, intestine may be so much matted round the tumour that it is extremely difficult to distinguish inflamed gut from a dilated Fallopian tube, and

consequently there is great danger of wounding it. It is impossible to lay down a hard-and-fast rule for treatment of such adhesions. In some cases the handle of a scalpel, or a pair of blunt-pointed scissors, can be used with safety; in others separation must be effected by laborious, slow and cautious working with the tip of the gloved finger; while in others it is necessary to dissect the tumour away from the intestine, leaving in places a thin layer of the tumour wall attached to the gut. After separation the intestine must be examined with minute care, and any weak spot fortified by insertion of Lembert sutures. The same advice will apply to separation of bladder from the tumour, it being remembered that inflamed bladder wall will tear readily if force is used. In any case where there is doubt as to whether the bladder has been wounded or not a catheter should be passed into the bladder from below, and the point directed towards the suspected part of the bladder wall. As a rule if doubt exists the bladder has not been wounded. A wound made in the bladder during a difficult ovariectomy will usually heal without any bad results if it is carefully sewn up, the bladder being kept empty for the first few days by a soft catheter fixed in the urethra by a stitch through one of the labia. If a small drain is inserted, leading from the abdominal wound to the neighbourhood of the wound in the bladder, it will be found that this can be removed in a day or two, no urine escaping along it.

Should an inflamed ovarian tumour be adherent in the neighbourhood of the pelvic portion of the ureter, great care must be exercised in pulling or cutting, and no cutting must be done blindly in the depths of the pelvis. Sometimes the position of adhesions on the deep surface of the tumour renders ligature impossible until the tumour has been removed. In such a case the adhesion should be clamped before being cut, after it has been ascertained that the clamp is clear of the ureter and rectum.

In rare cases it may be found that the wall of a large adherent cyst is so rotten that it is impossible to remove it all from the walls of the abdominal cavity, portions of it having to be left behind. If a very large area has to be left *in situ* it may be well to drain the abdomen by the vagina. In one such case in which I did this a large quantity of fluid came away for the first five or six days, and after this recovery was interrupted.

Oozing from raw surfaces left after separation of adhesions is treated by ligature, understitching and temporary pressure. Permanent gauze-packing is seldom necessary. Some operators advise leaving 1 or 2 pints of saline solution in the peritoneal cavity as a means of stopping oozing, and this method can do no harm.

Experience shows that oozing after closure of the abdomen is less than is expected at the beginning of one's operative career.

Occasionally, especially in cases where adhesions were very numerous, there may be sufficient oozing to make a collection of fluid in Douglas's pouch. Rise of temperature will show that there is something wrong, and vaginal examination will discover bulging of Douglas's pouch. An incision with blunt-pointed scissors through the posterior fornix will allow the fluid to escape. An anæsthetic is not necessary unless the patient is very nervous. If the fluid is allowed to remain long, it may become infected.

Tapping the Cyst.—Formerly it was customary to tap most ovarian cysts, so as to diminish their bulk, before removing them, a comparatively small abdominal incision then sufficing. The more modern practice is to remove cysts whole whenever possible. There is no objection to tapping if the contents of the cyst are watery and harmless, but in practice it is sometimes difficult to be quite certain that the contents are of this innocuous nature. The contents of ovarian dermoids, inflamed, suppurating and malignant cysts and of some pseudo-mucinous cysts are harmful. There is, as a rule, no difficulty in deciding that the tumour is a dermoid, or that it contains blood or pus, before it is opened, and in cases of very thin-walled cysts the translucent character of the wall may make the operator feel certain that the contents are serous; but in some cases there is doubt. A dermoid usually has a thick, opaque, rather yellowish-coloured wall, sometimes portions of bone or cartilage may be felt in it, and in the rarer cases in which the wall is transparent in places fat may sometimes be seen inside. A cyst with many recent adhesions must be looked on with suspicion as being likely to contain pus or blood: if it is grey and sloughy looking it probably contains pus, if it is plum-coloured it certainly contains blood—if only in its wall. A multilocular adenomatous cyst is best removed whole, as mucoid or colloid material cannot be removed even by a large trocar with certainty that none of it will run into the peritoneal cavity or over the operator's gloves. In the majority of cases no harm results from soiling of the peritoneal cavity with this mucoid fluid, but in some the colloid material forms recurrent tumours in the abdomen. In one case of my own no less than six abdominal sections, spread over a period of three years, were necessary for removal of jelly-like tumours after an ovariectomy in which a ruptured pseudo-mucinous cyst was removed, the last, the seventh operation, being fatal from peritonitis due to injury to small intestine which was involved in the tumour. It is impossible to be certain that a multilocular

"adenomatous" cyst is not partly carcinomatous. Should a carcinomatous cyst be punctured, recurrence may occur in the abdominal scar. Small tumours should be removed entire, and all large ones which give rise to any suspicion that their contents are not serous. Large unilocular cysts with thin translucent walls, in which no solid masses or papillomata can be felt, may be tapped, as far as our knowledge goes at present, without risk, and the collapsed cyst removed through a small incision.

Ligature of the Pedicle.—Most ovarian tumours are attached by a pedicle connecting them with the pelvis and the uterus. This pedicle consists of the ovarian ligament and two layers of peritoneum, the broad ligament, which enclose between them the ovarian vessels, Fallopian tubes, parovarium, etc.

The old method of ligature of the pedicle was to transfix it and tie it in one large mass with interlocking ligatures. This method is not to be recommended. If a large bunch of tissue, including peritoneum, ovarian vessels and Fallopian tube is tied in one mass there is danger of the ligature slipping some hours after closure of the abdomen, with severe hæmorrhage resulting. This danger is greater when the pedicle has been tied while in a state of tension. When this accident has occurred it has been found that part of the pedicle has withdrawn itself from the ligature, so that the loop, though still surrounding the vessels, is loose and allows bleeding to occur. Again, this large bunch of tissue presents a raw surface to which intestine is likely to become adherent. A third disadvantage of this method lies in the fact that blind transfixion of the pedicle may result in puncture of a vein, which may not be noticeable at the time, but may cause the formation of a hæmatoma, spreading into the iliac fossa, and sometimes tracking up behind the peritoneum towards the region of the kidney, the so-called "lost disease."

The ideal treatment of the pedicle is to ligature the vessels without any surrounding tissue, the Fallopian tube and ovarian ligament being tied separately (Fig. 1). The edge of the knife is drawn across the pedicle, front and back, at the level where the vessels are to be tied, dividing the peritoneum only. The proximal edges of the peritoneum are separated from the vessels by pressure with the finger-tip or handle of a scalpel until a small peritoneal flap is obtained. The vessels are then tied, two or more ligatures being applied according to the breadth of the pedicle, and the ovarian ligament and Fallopian tube are tied separately. Sometimes when the ovarian ligament is unusually thick it is safer to transfix it rather than to trust to an ordinary ligature. There is no need for the

ligatures to be of thick material when the pedicle is treated in this manner. Pressure-forceps are then applied to the distal part of the pedicle, to prevent hæmorrhage from the tumour, and the pedicle is cut through between the ligatures and the forceps (Fig. 2). A continuous suture then buries the cut surface, including the stumps of the ovarian ligament and Fallopian tube, under the peritoneal flaps, so that no raw surface is left exposed. If the Fallopian tube is not removed, it can be made to cover the raw surface.

The pedicle of a left-sided tumour may involve the meso-sigmoid.

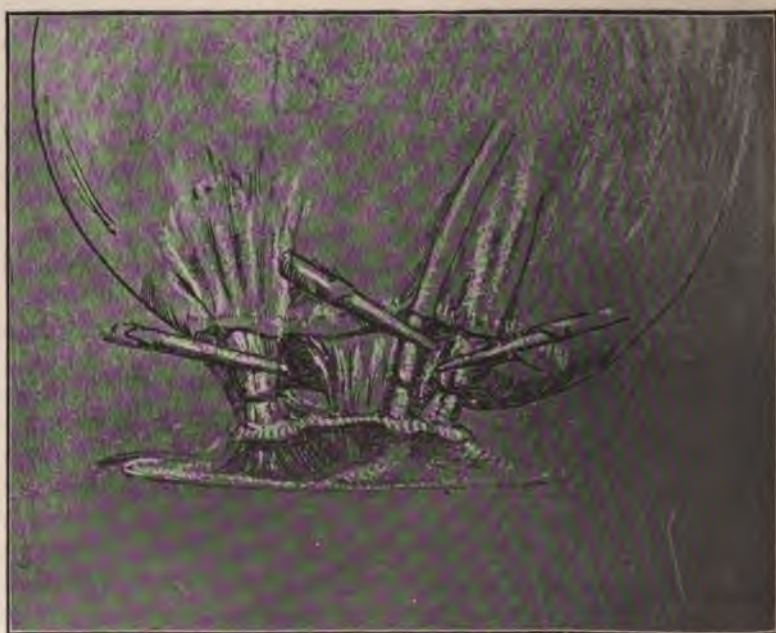


FIG. 1.—Ligature of the ovarian artery and veins, the ovarian ligament and the Fallopian tube after the peritoneum has been stripped from them.

In such a case it is specially important to ligature the vessels alone, as ligature of the pedicle *en masse* might interfere with the gut, and also because movement of the bowel would be likely to cause slipping or loosening of the ligature.

In case there is a large stump of the pedicle which cannot be covered by a continuous suture of peritoneum over it, it may be buried in the broad ligament in the way shown in the accompanying illustration borrowed from Dr. Blair Bell (Fig. 3).

In the case of some suppurating cysts it may be necessary to tie the ovarian vessels high up, above the infundibulo-pelvic ligament,

the cellular tissue of the broad ligament being so much infiltrated that separation of the vessels lower down is impracticable.

Injury to Intestine.—The intestine may be injured by the scalpel or bistoury in making the abdominal incision if it is adherent to the anterior abdominal wall, or it may be torn in separation of adhesions. A clean cut or tear can be sewn up with ease and success. The most troublesome part of the intestine when injured during ovariectomy is the rectum. It may be torn during the separation of the deep attachments of an inflamed tumour, or a suppurating dermoid may have opened into it before the operation. It may be possible to sew up the opening, though in this case the operator will probably consider it safer to drain the pelvis than to trust entirely to his suture; but sometimes suture is



FIG. 2.—The raw tissue of the pedicle has been buried under a continuous suture.

impossible owing to the inaccessible position of the opening. It may be possible to shut off the lower part of the pelvic cavity by suturing the rectum above the wound to the back of the uterus. Whether this is possible or not, the lower part of the pelvic cavity should be drained by the vagina, and a rectal tube should be used for three or four days.

Drainage.—Most operators find that they employ drains less as they acquire more experience, and at the present time drainage after ovariectomy is rarely used, except in cases where the pelvic cavity has been soiled by pus or where the rectum has been injured. Gauze drainage through the abdominal wound is, as a rule, a failure, the gauze being found on removal to have acted as a plug rather than as a drain. A thin wick of gauze inside a large drainage tube will act as a drain through the abdominal wound, but is seldom

called for. I should use drainage through the abdominal incision after ovariectomy for only two conditions, viz., injury to intestine and injury to bladder, a small rubber drainage tube being left in with its lower end in the neighbourhood of the injured viscus, if there was doubt that the injury had been repaired satisfactorily. If the pelvic cavity has been soiled extensively by pus owing to the bursting of a suppurating cyst, and in some cases of injury to the rectum, drainage by a large tube leading into the vagina, the patient being kept in Fowler's position for some days, is to be



FIG. 3.—The stump of the pedicle has been gathered up by a suture, both ends of which are passed through the broad ligament and tied on its anterior surface. (By kind permission of Dr. Blair Bell and Messrs. Longmans, Green and Co.)

advised, and in my opinion is much more effective than is drainage through the abdominal wound. The simplest plan is for the operator to pass the blades of a long pair of curved scissors into the vagina from below, and to cut through the posterior fornix, guided by the fingers of his other hand inside the pelvis. If the patient's thighs are separated widely, he will not touch anything with his glove except the scissors. This plan is more rapid and more satisfactory than that of cutting down on the points of a pair of forceps passed up the vagina by an assistant. When the opening in the posterior fornix has been made, a pair of sponge-holders is pushed up the vagina through this opening by the operator or an assistant, and

made to grasp the end of the drainage tube inserted into the abdomen from above. The tube is then drawn down with the sponge-holders until about 3 inches are left in the interior of the pelvis, and is later on fixed by a suture at the vulva. The pelvic cavity can be washed out through the drainage tube if necessary—in practice this is seldom needed—and if all goes well the tube can be removed about the sixth day.

If the tube is taken away too soon it may be necessary to re-open the hole in the posterior fornix to let out retained fluid, and there will be danger of this tracking up to the abdominal wound. Some operators prefer to use a self-retaining rubber tube inside which is a glass tube which fits it tightly.

Suture of the Abdominal Wall.—

There are many good methods of suturing the abdominal wall having one essential point in common, viz., they do not trust entirely to a through-and-through suture. The object is to secure accurate apposition of the various layers without formation of a large amount of fibrous tissue. Most patients dread the removal of stitches, and although anticipation is usually far worse than the reality, there is an advantage in using no stitches that have to be removed, and also in leaving a scar which becomes almost imperceptible as time goes on.

If the nature of the operation renders it at all likely that suppuration may occur, I prefer to use interrupted rather than continuous sutures, except for the peritoneum. The quickest efficient method, if the saving of a few minutes is of importance, is to insert sutures of silkworm gut through the whole thickness of the abdominal wall, and catgut sutures through the aponeurosis, and to use a few sutures of fine catgut or silkworm gut, or metal clips, to bring the skin edges into apposition.

If there is no great hurry the peritoneum should be sewn up with a continuous suture of fine catgut. When that has been done



FIG. 4.—Continuous subcutaneous suture, the first part of which has been pulled tight.

silkworm-gut sutures may be passed through all the layers except the peritoneum, and tied after suture of the aponeurosis, the skin edges being brought together as above. I use this method when there is much fat in the abdominal wall.

The method that I prefer for ordinary cases, *i.e.*, those in which the abdominal wall is not unusually fat, and in which there is no likelihood of suppuration, is to sew up entirely in layers with catgut, finishing up with a continuous subcutaneous suture (Fig. 4). In sewing up the skin with a buried suture a knot is tied about an inch from the distal end of the suture, and the other end is cut short one inch from the wound after the stitch has been pulled tight. A continuous suture for the aponeurosis is not so good as interrupted stitches, because the thick catgut used for this layer does not lend itself well to a continuous suture.

Dressing.—The wound is covered by a swab while the towels are removed and the surrounding skin washed and dried. Then the wound is dressed, two or three folded pads of sterilised white gauze being laid on it, and then pads of sterilised gamgee tissue are applied over the gauze. When a boatshaped abdomen is left after removal of a large tumour from a thin patient, a large quantity of gamgee tissue is needed to make the patient comfortable and prevent accumulation of blood in the vessels of the abdomen which have been freed from a long-standing pressure, and also to prevent flatulent distension. It is unnecessary, and produces discomfort, to apply a large amount of gamgee tissue to the abdomen of a fat patient, especially in hot weather. A “many-tail” bandage or binder is then applied, the former being the better in my opinion, as being less likely to become displaced and rucked up.

The wound is inspected on the fourth or fifth day, and a fresh dressing is applied to it. Unless the dressing has stuck to the wound or the ends of the sutures have become entangled in the gauze, this is unnecessary, but the changing of the dressing is as soothing and refreshing to the patient as is a change of clothes. As a rule, silkworm gut stitches can be left in until the tenth day. It is sometimes necessary to remove one or two of the deep stitches on the eighth day if they are tight; but in most cases they can all be left until the ninth or tenth day. If the patient is very stout, especially if she coughs a good deal, it is well to apply long broad strips of strapping to support the wound for a few days, but in ordinary cases there is no need to use any strapping. If a buried catgut suture has been used for the skin, it should be pulled out on the sixth day. Unless there is any reason for keeping the patient at rest for a longer period she is allowed to get on to a couch or

chair on the sixteenth or seventeenth day, and to walk on the nineteenth day.

She should be warned that for the next three months the abdominal scar will be a comparatively weak spot, and that any violent straining or lifting effort must be avoided.

Opinions are divided as to the advisability of making patients wear abdominal belts after ovariectomy. If the abdominal wall is muscular, the patient healthy, and the wound small, a belt is not necessary; but if the patient is feeble or very fat and the wound large, it is a good plan to make her wear a belt for at least one year.

After-treatment.—Not only has the mortality of ovariectomy been greatly reduced, but also the discomfort and misery attending it. Not many years ago patients were deprived of fluids for twenty-four to thirty-six hours, and their bowels were kept closed for six or seven days, and they suffered a great deal from thirst and from flatulence in consequence. There is almost always a certain amount of pain and distress after ovariectomy, but as a rule the distress is only of short duration, and after the first twenty-four hours the patient is comfortable and free from pain unless she is troubled temporarily by flatulence.

Common-sense is the most important thing in the after-treatment. One cannot lay down hard-and-fast rules for the treatment of all patients after ovariectomy any more than for healthy people. The main points are to give them plenty of fluid, and get the bowels open early.

If the operation has been a severe one, particularly in cold weather, it is essential that the bed should be thoroughly warmed before the patient is put into it. Many nurses prepare the bed by folding all the bedclothes neatly to one side, leaving the under-sheet uncovered, with one or two hot-water bottles down the middle. When the operation is over the patient is then laid on a bed the under-sheet and mattress of which are cold except down the middle, and a cold sheet and blankets are put over her. The proper way to arrange the bed is for it to be covered up, as if the patient were in it, with plenty of hot-water bottles, while the operation is in progress. When the operation is over the hot-water bottles are taken out and the bed is only opened just while the patient is being put in. By this means she is entirely surrounded by warm bed clothes. It is impossible to mention too often the danger of leaving hot-water bottles in the bed with an unconscious patient. Hot-water-bottle burns are painful and very slow to heal, and may be caused even by the modern indiarubber "bottle" in its flannel cover. If the bottles are left in the bed with an unconscious

patient, they must be separated from her by at least one blanket, and must not be in close contact with her.

If the patient is suffering from shock the foot of the bed should be raised up for some hours, unless the lower part of the abdominal cavity has been soiled with pus, in which case the head of the bed should be raised as soon as possible, to diminish the risk of absorption by the peritoneum of the upper part of the abdomen. When a long operation has been performed with the patient in the raised-pelvis position, it is well to have the foot of the bed raised at first and brought down gradually during the course of a few hours, an abrupt change in position being trying to an exhausted patient.

After a serious operation the patient should have 1 pint, or more, of saline solution, given per rectum with a catheter and funnel, as soon as she has been put back into bed. In my practice every patient who has had an abdominal operation is given saline solution. If necessary $1\frac{1}{2}$ pints are given at first; $\frac{1}{2}$ pint of coffee may be added to the saline solution with advantage in the opinion of some experienced nurses. In cases where further rectal injections are to be given the catheter should be left in the rectum, and a knot tied in the rubber tubing or a clip placed on it to prevent leakage. If the catheter is left in there is little irritation of the rectum, and less chance of the fluid being returned than if it is taken out after each injection. When the catheter is left in continuously the patient is unconscious of it, and does not know when she is being given subsequent injections. Another pint can be given in two hours' time, and then $\frac{1}{2}$ pint every two hours until the end of twenty-four hours after the operation, when a turpentine enema is given through the funnel and catheter. The catheter must then be withdrawn for a time, and put back later if further saline injections are required. Administration of saline solution does away with three sources of discomfort after ovariectomy, viz., thirst, constipation, and flatulence. Should the patient complain of thirst in spite of administration of saline solution she may be given sips of water, hot or cold, as soon as she asks for it. The old method of withholding fluid for twenty-four hours or more is unnecessary and cruel. If the vomiting is not severe she can have a small cup of tea in five or six hours after the operation, but should not be given more than 4 or 5 oz. at a time, as large drinks are very likely to cause vomiting. Many patients who have been given saline solution experience very little thirst, and are perfectly contented with 1 oz. or 2 oz. of fluid at a time by the mouth.

When there is pain and distress, as there generally is a few hours after the patient has come round from the anæsthetic, there is no

objection to giving one injection of morphia ($\frac{1}{4}$ gr.). Morphia used to be forbidden after abdominal section, because it caused flatulent distension; but this objection is done away with by administration of a turpentine enema twenty-four or thirty-six hours after the operation. In vaginal operations the most acute pain is felt directly the patient comes round from the anæsthetic, and a morphia suppository given at the end of the operation is the best means of preventing this pain; but after abdominal operations it is best not to give morphia until some hours after the patient has come round from the anæsthetic, at the time when she needs it most. It is best not to repeat the morphia, and there seldom is any call for its repetition. The effects of repeated doses of morphia are that the abdomen becomes distended, the bowels cannot be opened without great difficulty, and there may be hiccough and vomiting—altogether the condition of the patient is alarming. Repeated enemata, injection of pituitary extract, etc., may remove these symptoms, which suggest the presence of peritonitis; but I do not think that there is any exaggeration in saying that three or four doses of $\frac{1}{4}$ gr. of morphia may kill a patient after ovariectomy. Repeated doses of morphia are seldom given except by men whose opportunities of studying the after-treatment of operation cases are rare. If the patient clamours for more morphia, 10 gr. of aspirin or antipyrin, or 5j of bromidia, will often relieve her pain and cause her to settle down to sleep. In some neurotic women a hypodermic injection of a few minims of distilled water will sometimes do wonders. It may be taken almost as an axiom that a patient who sleeps well after ovariectomy is going to do well.

If the vomiting has ceased the patient may be given bread-and-butter, toast, custard, and practically anything she likes to drink in moderation on the second day. After this her diet is simply that of a woman in bed.

The patient is usually more comfortable if she is allowed to lie on her side after ovariectomy rather than on her back, and if there is any vomiting the lateral position is distinctly advantageous. A pillow should be pushed in against her back to support her. If the abdomen is large, a small pillow placed under it will make her more comfortable and will tend to prevent backache.

Vomiting.—Some patients do not vomit at all after ovariectomy; but the majority vomit occasionally for a few hours, and in some cases the vomiting is severe, distressing and long-continued. Women who suffer severely from sea-sickness or train-sickness are likely to suffer from post-anæsthetic sickness. Patients who have taken the anæsthetic badly, with straining and possibly vomiting

during the anæsthetic, are particularly likely to vomit afterwards. The best preventives of post-anæsthetic vomiting are having the bowels well opened and fasting for five or six hours before the operation, and absolute quiet in a darkened room after the operation. Very hot water may be given to stop the vomiting. Many patients get most relief from drinking half a pint of warm water containing two or three teaspoonfuls of bicarbonate of soda. This is soon brought up again, washing the stomach out. In some cases it is best to wash out the stomach with an œsophageal tube. Application of a mustard-leaf or blister to the epigastrium is well worth a trial. In many cases, just as in sea-sickness, it is a good thing to give the patient some solid food, *e.g.*, dry toast. This cleans the mouth, does away with some of the gastric discomfort, and has a good mental effect, the patient thinking that she cannot be very ill if she is given solid food.

The main thing in treatment of severe vomiting after ovariectomy is to get the bowels well open. Castor-oil is the best drug to give by the mouth in these cases, and is seldom vomited if given in the following manner: 1 oz. of black coffee is put into a wineglass with 1 oz. of castor-oil on top of it, and $\frac{1}{2}$ oz. of brandy on top of the oil. The brandy has an anæsthetic effect on the palate, the oil is hardly tasted, and the coffee leaves a clean taste in the mouth. When the bowels have been well opened by castor-oil and an enema, the vomiting nearly always ceases. Long-continued vomiting is not necessarily of grave prognostic significance, provided that the pulse-rate is not becoming progressively more rapid. Tincture of iodine (given by the mouth in 1-minim doses) is sometimes successful in stopping vomiting.

Ice is not to be recommended in treatment of vomiting, unless the patient, perhaps because she is American, is very anxious for it. Sucking ice produces a burning sensation in the throat which is not of much consequence if the patient can drink freely, but adds to her discomfort if vomiting prevents her taking large quantities of fluid. Iced champagne in small quantities, *e.g.*, 1 oz. or less at a time, is sometimes useful. In neurotic patients administration of 30 gr. of potassium bromide per rectum may have a good effect.

Hiccough.—Apart from peritonitis, hiccough rarely occurs after the bowels have been opened. The treatment is much the same as that recommended for vomiting, *viz.*, getting the bowels open and applying a mustard-leaf or blister to the epigastrium. Administration of two or three drops of oil of cajuput or terebene on a lump of sugar, or 15 minims [U.S.P. 8 minims] of essence or tincture of ginger in a little water, will often give relief.

Shock.—After an ordinary ovariectomy the shock is, as a rule, only slight, and some patients are themselves again in a few hours; but the removal of a large adherent tumour is generally followed by a certain amount of shock, which may be profound. The chief measures useful in the treatment of shock are warmth and saline solution. If there has been much loss of blood, the patient may require a very large quantity of saline solution; but if she is suffering from shock alone, not combined with the effects of hæmorrhage, 2 or 3 pints will probably suffice. When the operation has been a long one, the patient being in the raised-pelvis position throughout, the mere change into a horizontal position may be sufficient to cause a certain amount of shock, and the foot of the bed should be kept raised for some hours. In severe cases of shock saline solution may be given continuously *per rectum* or into the cellular tissue of the flank or under the breasts. It may be necessary to inject a couple of pints of saline solution into a vein at the end of the operation with the patient still in the Trendelenburg position in a case where her condition is extremely feeble. Drugs are disappointing in the treatment of shock, though ergotin seems sometimes to be of use. Infundibular extract is said to be worth a trial. Strychnine, which was formerly used largely, is now almost universally condemned in the treatment of shock. Supra-renal extract seems to be of use, but its results are evanescent.

Bleeding.—Hæmorrhage after ovariectomy is a rare occurrence, although it was not by any means unknown in the days of ligaturing the pedicle *en masse*. Dangerous oozing from adhesions may occur, though, as was said above, oozing after closure of the abdomen is rare. It may occur after a long operation in the raised-pelvis position, the patient's blood-pressure being too low for bleeding to occur at the end of the operation. Increasing pallor, increasing frequency of the pulse, which is small and soft, sighing respiration, the peculiar restlessness—jactitation, with subnormal temperature, and coldness of the extremities would make up a clinical picture of which the only explanation would be that the patient was bleeding. The abdomen should be opened, the uterus pulled up, and the pedicle examined. If this is not the source of the bleeding, a search must be made for the oozing surface or bleeding point, after swabbing out the abdomen, and further bleeding checked by packing with dry gauze if neither ligatures nor sutures can be used. Swabbing with a solution of supra-renal extract sometimes checks oozing from a raw surface. Meanwhile, saline solution must be given either into a vein or into the cellular tissue under the breasts.

Peritonitis.—Peritonitis after ovariectomy is a rare occurrence, except in cases of suppurating cyst or injury to intestine. After a difficult ovariectomy in which many intestinal adhesions have been separated, it is not uncommon to see symptoms which are suggestive of peritonitis. The abdomen becomes more and more distended because of paralytic distension of the intestines, vomiting is frequent, the pulse is rapid and of poor quality, and hiccough may add to the patient's distress. If an evacuation of the bowels can be obtained, the operator's anxiety is practically at an end, and the patient's condition undergoes rapid improvement; but it is by no means easy to get the bowels to act in all cases, the vomiting prohibiting administration of purgatives by mouth. Castor-oil is more likely to be kept down than other drugs, except perhaps croton-oil, which many operators prefer not to use. Repeated enemata, containing turpentine, etc., may lead to the desired result, but operators have long wished for an aperient drug which could be administered subcutaneously. Infundibular extract seems to fulfil this long-felt want. It is given by intra-muscular injection (1 c.c. of a 20 per cent. solution) with excellent results. (Blair Bell.)

If there is evidence of intestinal obstruction, the abdomen should be opened and a search made for a coil of intestine adherent, probably, to some raw spot which was not sufficiently covered with peritoneum. If such a coil is found it should be freed, and infundibular extract given. The prognosis is grave but not hopeless. A distended coil may be opened and drained by a Paul's tube.

If peritonitis occurs, the condition is almost hopeless. It must be treated on ordinary surgical lines: opening the abdomen, flushing and drainage, continuous saline solution, etc.

Thrombosis.—Thrombosis in the leg or thigh after ovariectomy is less common than after abdominal hysterectomy. Some authorities consider that it is always a sign of sepsis, but this is a hard doctrine to accept. I used to keep my patients in bed for three weeks after any abdominal section, and found that thrombosis appeared most commonly just as they were to be allowed to get up. Since I adopted the plan of letting them get up on the sixteenth or seventeenth day I have seen very little thrombosis. This improvement may be partly due to the fact that the patients are not kept lying down so long, but probably routine administration of saline solution *per rectum* has more to do with it. I began to wear rubber gloves for all abdominal operations at about the same time that I began routine administration of saline solution.

The leg should be wrapped in cotton-wool, and fixed on an inclined plane or pillows so that it cannot be moved. If there

is pain, painting with glycerinum belladonnæ has a soothing effect. The vein should not be examined after the thrombosis has been discovered, lest a portion of the clot should be displaced and lead to pulmonary embolism. Fortunately this accident does not often follow evident thrombosis of the leg or thigh after ovariectomy. When it does occur, there is often no evidence of thrombosis except post-mortem. Some writers advise administration of citrates or citric acid to lessen the coagulability of the blood, but it is doubtful whether much practical result is obtained.

The next Menstrual Period.—It is not very rare for the patient to have a considerable degree of pyrexia with a certain amount of abdominal pain, increased pulse-rate, etc., at some period of her convalescence after ovariectomy. Examination finds no physical signs to account for the disturbance, but the menstrual history shows that another period is due, and with the appearance of the menstrual flow all the untoward symptoms clear up.

Vaginal Ovariectomy.—Some operators perform vaginal ovariectomy frequently, but I have very little personal experience of it, though I have seen several such operations performed by others. In the case of small tumours which are freely movable, the operation presents no difficulties, a broad incision through the posterior fornix giving free access to the pedicle; but I cannot recommend the vaginal route for removal of large ovarian cysts, even though they may appear to be free from adhesions and unilocular. It is impossible to prophesy with certainty that there are no adhesions to the gut, there may be troublesome hæmorrhage, and the pedicle cannot always be treated in the modern way, *i.e.*, by covering all raw surfaces with peritoneum. Again, it may be necessary to tie the pedicle when it is under a certain amount of tension, with risk of the ligature slipping after lapse of some hours, and occurrence of hæmorrhage. The only advantages of removing ovarian tumours by the vaginal route are that the patient does not have to stay in bed so long and has no abdominal scar; but in my opinion these advantages are outweighed by the increased risk. It is not uncommon for an ovariectomy begun by the vaginal route to be finished by the abdominal on account of unexpected difficulties being met with, *viz.*, bleeding or adhesions.

H. RUSSELL ANDREWS.

PROLAPSE OF THE OVARY.

In the majority of cases "prolapse of the ovary" accompanies a painful retroversion of the uterus, and its treatment is that of the retroversion. In other cases the uterus itself is also prolapsed, and lifting up the uterus lifts the ovary up as well.

If the ovary is fixed down by adhesions and its mobility cannot be restored by hot douches, ichthyol tampons, etc., the best treatment will be to open the abdomen, free the ovary, and stitch it in such a manner that it cannot get too low down again, but such a case is one of salpingo-oöphoritis rather than one of prolapse of the ovary.

Sometimes the uterus is in its normal position, but one ovary, not much enlarged, lies low down in Douglas's pouch, so that it is exposed to pressure, and the patient complains of pain on defæcation, dyspareunia, and aching pain. Treatment of her general health, practically the treatment of neurasthenia, may give a good result. In some cases the aching and tenderness of the ovary seem to be due to too frequent or incomplete sexual intercourse or to masturbation. The appropriate advice, if carried out, will give relief. A thick ring pessary may be successful by raising the ovary and protecting it from pressure.

In some cases it may be necessary to open the abdomen and perform "ovario-pxy," i.e., stitching the ovary to some more or less fixed point, *e.g.*, the back of the upper part of the broad ligament or to the cornu of the uterus. Suture of the broad ligament to the abdominal wall has been advised, also pleating of the ovarian ligament. Mauclore has devised an ingenious operation for prolapse of the ovary. The ovarian fimbria is divided, a hole is made in the broad ligament, and the ovary pushed through so that it lies in front of the broad ligament, the fimbriated end of the Fallopian tube is stitched to the anterior surface of the ligament close to the ovary, and the hole in the broad ligament is closed.

An operation on a perfectly movable ovary, if normal, is not often called for.

An important point in the treatment of prolapse of the ovary is to avoid telling the patient that her ovary is prolapsed.

H. RUSSELL ANDREWS.

SUPPURATING OVARIAN CYSTS.

THE diagnosis of suppuration of an ovarian cyst can often be made before operation. In other cases it cannot be made until the abdomen has been opened, when the appearance of the cyst, a muddy grey or yellow colour, presence of numerous recent adhesions, and sometimes an offensive smell point to suppuration.

If suppuration of the cyst is suspected, the pelvis should not be raised, for fear of infecting the upper part of the peritoneal cavity. The vagina should be cleansed before the operation is begun, in case vaginal drainage should be found to be necessary. The essential points are: a large incision, so that there may be no unnecessary tension or pressure on the cyst during its removal, careful packing off of intestine and protection of the peritoneal cavity, and the utmost gentleness in manipulation. After separation of adhesions it may be possible to proceed as in an ordinary ovariectomy; but sometimes it is necessary to ligature and divide the connections of the cyst as they are met, without any set treatment of the pedicle. As the tumour becomes more and more movable it is lifted out of the abdomen with extreme care, and its connection with the rectum, if any, is separated as gently as possible. Only too often, just as the operator is beginning to congratulate himself on the fact that the cyst is coming out whole, it ruptures on being separated from the rectum. In some cases a communication between the cyst and the rectum has been established before the operation. If the cyst ruptures and floods the pelvis with pus there is considerable risk of peritonitis; but careful cleansing of the pelvis, followed by drainage *per vaginam*, with the head of the bed raised and administration of saline solution *per rectum*, will frequently lead to an almost unexpectedly good result.

In rare cases the exhausted, poisoned condition of the patient, the thin, friable-looking state of the cyst wall, and the presence of numerous adhesions may induce the operator to close the abdomen and incise the cyst by the vagina, leaving the removal of the cyst for a subsequent laparotomy when the patient has recovered from her toxæmia, and the interior of the cyst has been cleansed by drainage and syringing. Some operators decry this method of treatment on the grounds that the second operation will be as difficult and dangerous as if the cyst had been removed at once, but

the second operation may be a comparatively simple one. In one case I opened and emptied a large suppurating cyst by an abdominal incision, the general peritoneal cavity being not opened on account of the adhesions to the anterior abdominal wall. The cavity of the cyst was washed out with a solution of peroxide of hydrogen, the signs and symptoms of toxæmia disappeared; the subsequent operation of removal of the collapsed cyst wall three weeks later was unexpectedly easy, and recovery rapid and uninterrupted.

H. RUSSELL ANDREWS.

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DISEASES AND AFFECTIONS OF THE FALLOPIAN TUBES.

IN considering the diseases of the Fallopian tubes it is important to remember that the prime function of the tubes is the conveyance of ova from the ovary to the uterus. The tubes are composed mainly of unstriped muscle tissue continuous with that of the uterus; the interior of each tube is lined with mucous membrane arranged in folds and covered with ciliated columnar epithelium. This mucous membrane is directly continuous with the endometrium, but ends abruptly at the trumpet-like openings by which the Fallopian tubes communicate with the pelvic section of the peritoneal cavity. When removed from the broad ligament (in the free borders of which each tube lies) and stretched out, the shape of the tube is that of an elongated funnel. The broad mouth of this funnel will be referred to throughout this article as the *cœlomic ostium* of the tube; the narrow terminal end communicating with the cavity of the uterus is known as the *uterine end*.

The opinion was formerly held that the ova were wafted on their journey to the uterus by the motion of the cilia in the tube. Modern observations indicate that the ova are propelled into the uterus by the contraction of the muscle tissue forming the wall of the tube. The tubal epithelium furnishes a supply of mucus.

It is important to bear in mind that whilst the Fallopian tubes act as oviducts, and their chief function is the conveyance of ova from the interior of the pelvis to the uterus, they are permeable in the reverse direction, and fluids in the uterus, notwithstanding the minuteness of the uterine orifices of tubes, do enter their lumina and are conveyed into the pelvic section of the peritoneal cavity.

It is also an indisputable fact that spermatozoa find their way into the Fallopian tubes and even reach the ovaries. It is essential, in considering the diseases to which Fallopian tubes are liable, to remember that nearly all of them are the outcome of their functions as conduits.

ACTINOMYCOSIS OF THE FALLOPIAN TUBE.

THIS is a rare disease of the Fallopian tube ; in the reported cases the ovary has been involved also.

Great caution is necessary in accepting the contention of authors that actinomycosis in a given case is primary in the ovary or in the Fallopian tube. Abdominal actinomycosis is usually due to infection from the alimentary canal and, as a rule, in cases where the internal genital organs are infected with the streptothrix, the parts are so matted together that it is difficult to decide in which the disease started primarily. Clinically, actinomycosis infection of the tube and ovary gives rise to signs common to other forms of infective lesions of these organs, more especially tuberculosis.

The removal of the parts is invariably a difficult and troublesome proceeding accompanied by free bleeding, for the tissues of the infected organs are very friable. Difficulties of this kind arouse suspicion in the mind of the operator, and, as a rule, the parts removed are submitted to careful bacteriological investigation. Even then the nature of the disease is sometimes overlooked. After operation there is free suppuration and the disease runs a tedious course ; then the presence of the characteristic yellow bodies is noticed in the pus and the nature of the disease is recognised. Many of the women affected with actinomycosis of the pelvic organs die from exhaustion after much suffering, and in spite of iodide of potassium. In an interesting case reported by Frank E. Taylor (1909) as a primary actinomycosis of the ovary the woman recovered after oöphorectomy.

JOHN BLAND-SUTTON.

CANCER OF THE FALLOPIAN TUBE.

OUR knowledge of this disease dates from 1888; since then, thanks to the industry of Doran, records of one hundred cases are available for the purpose of guiding surgeons in its detection and treatment.

In its leading features this disease simulates cancer of the body of the uterus, and it is most common at, and for a few years after, the menopause. The chief clinical feature is an irregular blood-stained discharge from the vagina. It occurs in women who have had children as well as in those who are sterile. On physical examination the affected tube (for in the greater proportion of cases the disease is unilateral) is enlarged and can readily be felt by the bimanual method.

In some patients the symptoms have been so similar to those presented by primary cancer of the endometrium that the cervical canal has been dilated for diagnostic purposes and nothing cancerous found within the uterus, but the swelling on one side of the uterus has led to a correct appreciation of the trouble and the appropriate treatment. My experience of this disease comprises six cases, and it is of interest that two were complicated with uterine fibroids and two with ovarian cysts.

The cases in which the disease was associated with primary cancer of the tube are interesting in relation to the effects of treatment. Both women suffered from fibroids; hysterectomy was performed in each because of the profuse bleeding. An enlarged tube stuffed with soft growth was seen in each woman as soon as the uterus was withdrawn from the pelvis, and its malignant nature was suspected in each and confirmed in the laboratory.

During the operation on the first patient, a sterile married woman, aged fifty-seven, soft growth was seen protruding from the cœlomic ostium of the left tube, and where it came in contact with the rectum the peritoneum had become infected and a triangular area was covered with soft villous tufts of growths; I removed some with forceps, and wiped off as much as could be easily removed with gauze. Sub-total hysterectomy was performed with success. The patient enjoyed excellent health for eleven months; then signs of recurrence in the pelvis were manifest, and she died a few weeks later. This case illustrates the deadly nature of the disease, for an

analysis of a large number of reports relating to primary cancer of the Fallopian tube indicates that after the removal of the affected tube the disease, as a rule, quickly returns. The second case seems to show that the chances of recurrence depend on a circumstance beyond our control. For instance, a widow came under my care for hysterectomy on account of large uterine fibroids. In the course of the operation one of the Fallopian tubes was found enlarged and its cœlomic ostium completely occluded. In the laboratory we found this big tube to be stuffed with cancer. In this instance the



FIG. 1.—An ovarian cyst and the ampulla of the corresponding Fallopian tube. The tube is stuffed with cancer, and cancerous particles have leaked from its cœlomic ostium and become implanted on the cyst wall.

cancer arose in the ampulla of the tube and was prevented from soiling or infecting the pelvic peritoneum by the occlusion of its cœlomic ostium. This specimen is of very great interest, for it appears probable that the closure of the cœlomic ostium of the tube when its lumen is stuffed with cancerous material may exercise a great influence in limiting the disease to the tube for a long period, whilst, the patency of this orifice will favour the distribution of the cancer within the abdomen. At any rate, the results of the operations in these two women were in great contrast, for the patient with an open ostium survived for a year

and died of recurrence; whereas the widow with an occluded ostium was alive, had remarried, and remained in good health three years after the hysterectomy. Both women had uterine fibroids and sub-total hysterectomy was performed on each. It is possible that a primary cancer in one tube may infect the opposite tube through the open ostia.

That the leakage of cancerous material from the tube into the pelvic cavity is an evil thing can be demonstrated. In some of the early examples of tubal cancer reported in London a large cyst

complicated the condition. Two such examples have come under my notice.

A woman had an ovarian cyst as big as a cocoanut. In the course of its removal the base was adherent to the broad ligament, and its walls in this situation were suspiciously thick and hard. After the operation I made a careful examination of the tumour and found the Fallopian tube stuffed with cancerous material. The cœlomic ostium remained open and the malignant cells had streamed from it and infected the adjacent wall of the ovarian cyst. The remainder of the cyst appears to be quite simple. A microscopic examination of the tissue in the Fallopian tube showed it to possess the usual features of primary cancer as it appears in this duct, and I regret that the fears were well grounded, for the patient, though she recovered rapidly from the operation, fell seriously ill ten months afterwards with all the signs of disseminated cancer in the belly. She died about a year after the removal of the ovarian cyst.

In 1899 I had a similar experience in which an ovarian cyst became infected by being sprayed with particles from a cancerous Fallopian tube.

It is a noteworthy fact that bilateral cancer of the Fallopian tubes is more common than in any other paired organ. It is probable that some cases of bilateral cancer of the tubes, supposed to be primary, are secondary to a focus of cancer in some part of the gastro-intestinal tract.

With our present experience it is justifiable to treat primary cancer of the Fallopian tube by operative measures. In order to give patients affected with this disease the best chance the operation should be carried out as soon as the disease is discovered, and the uterus should be removed at the same time. The operative risks are not so great as when a cancerous uterus is removed, for in the latter case the organ has become septic before the operation is attempted, whereas the isolated position of a cancerous Fallopian tube protects it from the invasion of pathogenic micro-organisms; these have easy access to a cancerous endometrium, especially in a multiparous woman.

The only method of treating primary cancer of the tube is by a timely operation. If the cœlomic mouth of the tube has remained open and has permitted the cancerous material to leak into the pelvis, the outlook for the patient is sad indeed.

JOHN BLAND-SUTTON.

CHORION-EPITHELIOMA OF THE FALLOPIAN TUBE.

ALTHOUGH this dread disease attacks the Fallopian tube, sufficient facts have not been accumulated to enable the clinical features of this disease to be stated in a way which would enable it to be recognised before operation.

So far the leading symptoms and signs appear to be irregular losses of blood from the vagina accompanied by abdominal pain and the presence of a swelling on one or other side of the uterus. The disease occurs in women during the child-bearing period of life; otherwise the symptoms coincide with those caused by primary cancer of the Fallopian tube.

The consequences of operative treatment of this disease are not encouraging. The patients survive the operation until secondary masses form in the liver, lung, pelvis and abdomen. Drugs are of no avail except to modify the pain and discomforts incidental to a lingering death from malignant disease.

JOHN BLAND-SUTTON.

HERNIA OF THE FALLOPIAN TUBE.

THE Fallopian tube may occupy a hernial sac in the inguinal, femoral or obturator regions; it may be accompanied by the ovary or the uterus; sometimes it occupies the sac with omentum, bowel, or bladder. When the tube occupies a hernial sac alone, the swelling is termed a salpingocele. It is a rare condition. An inguinal salpingocele has been reported in an infant, but the condition is rare before the thirtieth year. Gladstone found the right Fallopian tube in the sac of an obturator hernia; the woman was seventy-eight years of age. I had an opportunity of examining the parts.

Some cases have been reported in which women have come under observation with a swelling in the inguinal or the femoral region which furnished the usual signs of a strangulated hernia. On opening the sac it was found to contain "the swollen fimbriated end of the Fallopian tube."

The treatment of salpingoceles is the same as that employed for inguinal or femoral herniæ: Return or remove the herniated body, dissect out the sac, ligature its neck and close the opening with sutures.

JOHN BLAND-SUTTON.

INFLAMMATION OF THE FALLOPIAN TUBES (SALPINGITIS).

THE importance of septic and gonococcal infections of the Fallopian tubes has only been appreciated during the last thirty years. We now know that septic material often finds its way directly into the pelvic section of the peritoneal cavity through the Fallopian tubes.

In order to treat disease satisfactorily it is necessary to know its cause. The introduction of surgical methods in the treatment of septic infection of the internal genital organs of women taught us that salpingitis is nearly always a sequel of septic infections of the genital canal. The chief of these are septic endometritis following labour or abortion, gangrene of a uterine polypus, gonorrhœa, and cancer of the uterus.

The advances of bacteriology and especially the discovery by Neisser (1879) of the gonococcus, gave a great impetus to the correct study and treatment of salpingitis and its sequelæ. The micro-organisms most frequently associated with infective lesions of the Fallopian tubes are the gonococcus, streptococcus, staphylococcus, pneumococcus, colon bacillus, and occasionally the *Bacillus pyocyaneus*.

The treatment of salpingitis must be considered in its acute and its chronic form. It will be advisable to briefly sketch the natural history of the disease.

The changes produced in the tubes by septic endometritis and gonorrhœa are identical, but the effects in the acute stage on the peritoneum vary according to the nature of the micro-organism responsible for the trouble.

When the infection extends from the endometrium to the tubal mucous membrane, the latter becomes swollen, soft and friable. The surface is covered with glutinous pus. When this infective material escapes through the cœlomic ostium into the recto-vaginal pouch it sets up peritonitis, and the symptoms are often as acute as when an inflamed appendix bursts. The symptoms are so often like those produced by the perforation of a septic intra-pelvic appendix that it is difficult and often impossible to distinguish between the two conditions.

When acute infection of the pelvic peritoneum supervenes on

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sepsis complicating delivery, or abortion, it is commonly called puerperal peritonitis. Often death follows quickly.

A careful study of the bacteriology of acute infections of the pelvic peritoneum due to leakage from a septic Fallopian tube, bursting of a pyo-salpinx, perforation of a vermiform appendix, or traumatic perforation of the uterus, indicates in no uncertain way that the fate of the patient depends on the species as well as on the virulence of the infecting micro-organisms. In acute cases where death ensues in three or four days after the leak, the infecting micro-organism is usually a streptococcus; those of moderate virulence are the colon bacillus and the staphylococcus. The gonococcus is the least virulent.

The direct infection of the pelvis from the open mouth of a Fallopian tube is not a matter of inference, but of direct observation. The symptoms are sometimes so acute and so like those caused by perforation of the intestine, or the rupture of a gravid tube, that many women are submitted to operation under the impression that they are the victims of one or other of these accidents. When the swollen tubes are withdrawn from the abdomen pus is seen leaking from their cœlomic ostia. In many instances I have removed tubes and ovaries in this condition, and a careful examination of the pus has revealed the presence of the gonococcus. This micro-organism infects the peritoneum and leads to the formation of extensive adhesions; it does not often destroy life from septic peritonitis, but produces disastrous effects on the tubes.

It was difficult to persuade my bacteriological friends that the gonococcus could set up an acute peritonitis. On one occasion I operated on a young woman presenting symptoms strongly suggesting acute perforative appendicitis. She was living under circumstances which did not lead me to suspect that she had gonorrhœa. In the course of the operation pus was seen leading from the mouth of a big soft œdematous Fallopian tube. This was removed, wrapped in a sterilised warm fold of gauze, and conveyed to the laboratory. In the tube Foulerton detected the gonococcus and succeeded in cultivating it on films. This observation has been repeated on several occasions, and gonococcal peritonitis is now a recognisable surgical affection. Gonococcal peritonitis gives excellent results when treated by cœliotomy and drainage.

Few attempts have been made to treat acute puerperal peritonitis in the same way. As a rule, surgical interference is postponed until the disease becomes well established; then surgical efforts are of little avail. In the more chronic cases an encouraging amount of

success has followed the use of vaccines. The discharges from the uterus are examined for the purpose of detecting the specific organism; this is grown in cultures and a vaccine prepared. In some instances, two or more species of micro-organisms exist in the discharges, and it may be necessary to obtain cultures of each and use them in turn. In some cases it is useful to employ a vaccine containing the toxins of two sets of micro-organisms present in the discharges.

Gonococcal Salpingitis in Children.—This affection requires careful consideration in treatment as well as from the medico-legal standpoint, for the question of criminal assault sometimes arises.

It is established that gonococcal vulvo-vaginitis occurs in epidemic forms in schools; the starting point may be accidental contamination by bedclothes when children sleep with parents or elder brothers or sisters; infection is also spread by the common use of towels or linen, or by the use of one bath for several children. Gonorrhœa may result from rape. The gonococcus is found with astonishing frequency in the vulvo-vaginal discharges of children. Some cases have been reported in which gonococcal peritonitis has occurred in little girls in an acute form; in many instances it rapidly subsides and rarely calls for surgical interference.

The Effects of Septic Infection on the Tubes.—In the less acute forms of septic salpingitis, whether caused by the gonococcus or other species of pathogenic micro-organisms, the effects upon the tubes are of an interesting kind. The swelling and œdema of the tubal tissues consequent on the infection lead to the occlusion of the cœlomic ostia, a fortunate event, as it prevents the leakage of septic or irritant fluid into the pelvic cavity. The ostium may be closed by the contraction and adhesion of the tubal tissues; by adhesion of the fimbriæ to the ovary, broad ligament or floor of the pelvis; or, in rare instances, by the formation of a capsule around the fluid, which exudes from the tube.

The occlusion of the cœlomic ostia of the Fallopian tubes is a somewhat chronic process; when complete, it carries certain advantages as well as entailing disabilities on the patient.

The occlusion of the ostia saves the patient from the dangers incidental to the leakage of infective material into the belly. When the accumulation of pus continues in the tube and distends it into a cyst, in shape and size like a ripe banana, the conditions are unsatisfactory to the contained micro-organisms, for they invariably die. Some years ago I made it a rule to have every specimen of enlarged tube, whether pyosalpinx or hydrosalpinx, which I removed, conveyed to the laboratory and bacteriologically examined.

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In acute cases we found micro-organisms of the species already mentioned, but in almost every specimen in which the disease had existed a year the fluid was sterile. In many tubes there was something which liquefied the gelatine in the culture tube, and occasionally there was a growth of colon bacillus.

Examination of the tubal tissues, especially near the uterine junctions, sometimes revealed the presence of micro-organisms. These are important facts, because they serve to explain that the good consequences which follow the removal of such tubes are largely due to the fact that the purulent fluid they contain is usually sterile.

After the micro-organisms have died in these saccular tubes the pus becomes thinner, and in the course of a few years is replaced by almost transparent fluid; at the same time the walls of the expanded tube become so attenuated that the sac looks like a thin-walled ovarian, or parovarian cyst. Such a condition is called a hydrosalpinx, and some of these are so large that they rise into the hypogastrium and furnish the clinical signs of an ovarian cyst.

The thinning of a wall of a hydrosalpinx may continue until the sac bursts; the fluid in this event escapes into the belly and is absorbed. The remnants of the sac adhere to the uterus and the broad ligaments, and the only trace of the Fallopian tubes is an impervious cord about one inch long attached to each angle of the uterus.

Occasionally the process is abbreviated, for when the tube is in the pyosalpinx stage it is liable to involve the rectum and burst into it, the pus being discharged through the anus. A pyosalpinx will sometimes burst into the bladder or the vagina, and on very rare occasions it will involve the anterior abdominal wall and simulate a subcutaneous abscess. I have had opportunities of studying all these methods of termination.

It is important to appreciate these facts, because they indicate in a definite way that mild septic infections of the Fallopian tubes tend to undergo spontaneous cure, and it is only the exceptional cases which require surgical treatment. I looked into this matter very carefully twenty years ago, because I was impressed by the fact that acute salpingitis and pyosalpinx are fairly common between the twentieth and thirtieth years of life, but they are rarely seen after the fortieth year. Hydrosalpinx is the common pathological condition of the tubes between the fortieth and the fiftieth years. Operative experience teaches that when the infective quality of pus in the tubes is not very great, a pyosalpinx may resemble a chronic abscess and cause few symptoms. This form of chronic

pyosalpinx becomes slowly and passively dilated with fluid and undergoes slow transformation into a hydrosalpinx. Anyone who takes the trouble to look into the matter will soon be able to convince himself that these statements are true. Pyosalpinx often causes trouble on account of interference with the bowels or the bladder; a unilateral pyosalpinx sometimes complicates pregnancy. Hydrosalpinx receives surgical treatment when it grows so large as to form a cystic swelling obvious in the hypogastrium, or when it undergoes axial rotation and twists its pedicle. This accident produces symptoms as acute as those induced when an ovarian cyst undergoes axial rotation. The limited degrees of infection, which do little more than seal up the cœlomic ostia of the tubes, do much mischief, for this sequel of bilateral salpingitis entails upon the patient an enduring sterility. When this occurs a few months after marriage as the result of a neglected gleet, it is an unfortunate event, and often entails not only a life long disappointment but often renders the young wife an invalid for many years.

When the tubes are occluded as a consequence of salpingitis, the sequel of septic endometritis following labour, then sterility follows, and many cases of "one-child sterility" are due to this cause.

This is a matter of some importance, because many women in such circumstances are extremely anxious to re-conceive. Attempts have been made in treating such cases by surgical measures to re-establish the communication of the Fallopian tubes with the peritoneal cavity. The conditions found when the abdomen is opened are usually these: The ovaries and the tubes are adherent to the back of the broad ligaments; the cœlomic ostium of each tube is closed and the end of the tube smoothly rounded off. Occasionally the tube itself is somewhat dilated and translucent. In such a condition many gynæcologists, instead of removing such tubes and ovaries, slit the dilated end of the tube and evacuate the fluid it contains; then with very fine silk they sew the edges of the slit carefully round in order to bring the mucous and peritoneal layers into union. This method of re-establishing a communication between the Fallopian tube and the recto-vaginal pouch is known as *Salpingostomy*, and its object is to furnish a channel for the egress of ova and the ingress of spermatozoa. This operation was frequently practised some years ago, but the results have not justified expectations, and it would be difficult to find five reliable reports in which this operation has been followed by a successful pregnancy. When the Fallopian tubes have been infected and their cœlomic orifices occluded in consequence, the impairment of their function as oviducts has been so extensive that

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no efforts of surgery are likely to restore it. This is a fact of some importance in its bearing on the opinion current twenty years ago, that chronic salpingitis was a cause of tubal pregnancy.

Hæmatosalpinx (Sacto-salpinx Hæmorrhagica).—This term is applied to a distended non-gravid Fallopian tube with an occluded cœlomic ostium. The cavity contains blood or blood-stained fluid. This term has lost much of its significance, since it has been established that nearly all the specimens formerly classed as examples of hæmatosalpinx were gravid tubes.

The conditions which fulfil the terms of the definition occur in association with congenital atresia of the vagina and cervix. When the girl becomes pubic the menstrual discharges are retained and distend the vagina, the uterus and later the Fallopian tubes, which in some instances are big banana-shaped sacs.

On one occasion a woman, the mother of seven children, came under my care for a large abdominal tumour. This tumour had been regarded by some competent gynæcologists as a uterine fibroid, an ovarian tumour, and as a cyst in the broad ligament. When the parts were exposed in the course of the operation, the uterus was bifid. The right half of the uterus had become a sac as big as a fist, and the Fallopian tube corresponding to it was transformed into a pear-shaped cyst containing a quart of blood; the cavity of this distended tube communicated with the interior of the right uterine cornu, but the pedicle by which this half of the uterus was attached to its fellow was impervious. I removed the right uterine cornu and the hæmatosalpinx.

The interesting feature of this case lies in the fact that the patient had conceived seven times successfully and successively in the left half of a bifid uterus. The cyst-contents of the right cornu and tube represented retained menses.

The majority of women who seek relief for diseases of the Fallopian tubes complain of pelvic pain, intensified at the menstrual periods, or on account of the presence of a swelling in the hypogastrium. A fair proportion of the patients are placed under the care of surgeons in consequence of acute peritonitis.

Acute Salpingitis demands absolute rest in bed and the routine use of mild vaginal injections. The bowels should be kept regular with saline purgatives. When the pelvic pain is very great warm fomentations should be applied to the hypogastrium, and sedatives should be judiciously employed.

When the symptoms indicate acute pelvic peritonitis and the patient's life appears imperilled, the surgeon will have to consider the advisability of performing cœliotomy. In discussing treatment

the surgeon is bound to remember that his diagnosis is not infallible, and though the signs appear to indicate leakage from an infected tube, the trouble may be due to rupture of a gravid tube, torsion of an ovarian cyst, perforation of an appendix abscess, or even a calculus impacted in the lower end of a ureter.

It is impossible to distinguish in many acute cases whether the trouble is due to a lesion of the tubes or of the vermiform appendix; occasionally both structures are at fault. The vermiform appendix and the right Fallopian tube are often in contact, especially in girls. In many cases an acute appendicitis will involve the adjacent tube, and I have seen a gangrenous ovary and tube lying in the midst of a stinking appendix abscess. The most extraordinary case

which has come under my notice occurred in a spinster who was suddenly seized with acute pelvic pain, and high temperature accompanied by a profuse vaginal discharge. On physical examination a tender swelling could be felt on the right side of the uterus. The diagnosis that the patient was the victim



FIG. 1.—An ovary with the Fallopian tube and the vermiform appendix shown in section. The tip of the appendix is perforated, and the pus was discharged into the colomic ostium of the tube and produced salpingitis. Tubal fimbriae.

of a pyosalpinx seemed undeniable. Cœliotomy was performed and a swollen vermiform appendix was seen with its tip adherent to and involved in the fimbriae of the Fallopian tube, which was swollen and as thick as a thumb. I removed the ovary tube and appendix without disturbing their relations to each other. When these parts had been carefully hardened, and divided, it was discovered that the tip of the appendix had perforated in the part adherent to the mouth of the Fallopian tube; the purulent material which leaked from the appendix was discharged into the tubal canal and escaped into the uterine cavity. This infective material had set up salpingitis (Fig. 1).

It is the common practice in acute cases of pelvic peritonitis when on opening the abdomen the tubes are found swollen and pus seen leaking from their ostia, to remove these swollen tubes and ovaries. This is a severe measure. Since it has been established that gonococcal peritonitis rarely is fatal, I have tried milder

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measures. For example, a young married woman, mother of two children and anxious for more, was seized with acute abdominal pain accompanied with high temperature; the conclusion appeared inevitable that she had acute appendicitis with probable perforation. Six hours later I performed the usual operation for appendicitis and opened the abdomen by means of the usual incision in the right flank. The vermiform appendix was thickened and unsatisfactory, but it did not appear to be sufficiently diseased to account for the acuteness of the symptoms. I then enlarged the opening to permit my hand to explore the depths of the pelvis; on withdrawing it purulent fluid welled up. A median subumbilical incision was made and on inspecting the tubes pus could be seen dripping from the orifice of the left cœlomic ostium. I contented myself with removing the ampulla of the left tube and washing the right tube, as well as the pelvic *cul-de-sac*, with warm sterilised water; the pelvic cavity was drained with a rubber tube for eight days. Much purulent fluid issued from the drain tube during the first few days. The temperature fell gradually and the patient made an excellent recovery.

Cases of this kind are uncommon; as a rule, the tubes are distended with purulent fluid and resemble in shape as well as in size bananas. The most satisfactory method of dealing with this form of acute pyosalpinx is removal of these big soft tubes with the uterus. It is also a wise precaution to remove the neck of the uterus also (total hysterectomy), otherwise the sutures applied to the infected stump will cause a very troublesome sinus.

The reasons for removing the uterus when it is necessary to extirpate the Fallopian tubes when in the condition of pyosalpinx are two. The chief reason is to save the patient the annoyance and often the misery of a sinus. The second concerns the remote consequences, for experience teaches that, when the internal genital organs of women have been infected with the gonococcus so severely that it has been necessary to extirpate both Fallopian tubes, the infection leads to changes in the endometrium, which cause severe hæmorrhages at the menstrual periods.

When operations are performed for the removal of acutely inflamed and adherent Fallopian tubes, it is not always possible to completely remove the ovaries also. The fragments of ovaries left in the pelvis are sufficient to maintain menstruation, and this event in women with sepsis of the uterus is not only sufficient to cause great inconvenience to one who works for her living,

but the hæmorrhages are in some instances so alarming as to seriously jeopardise life; failing this a woman in such circumstances becomes a chronic invalid. So many women have come under my care a year or so after bilateral removal of the tubes for chronic salpingitis, complaining of severe uterine hæmorrhages, that I have been forced to urge that it is safer and better surgery, when it is necessary to remove both Fallopian tubes for acute salpingitis, to perform hysterectomy.

Chronic Salpingitis is a very common disease, and rarely endangers life, but often causes so much inconvenience to those women who suffer from it that many become chronic invalids. The women complain of pelvic pain, they are sterile, sexual congress is distressing to them and menstruation is profuse, often prolonged and generally painful.

Rich patients, victims of chronic salpingitis, take life easily, visit English, Welsh or Continental health resorts, drink the water of hot springs, sit in vapour baths, or in the mud baths of Bohemia. Any new remedy advocated, or advertised, for the relief of diseases of women they try with zeal if not with persistence.

Women who earn their own living are anxious to adopt more radical measures. When the disease is severe enough to prevent them leading a useful life, it is justifiable to remove the ovaries and tubes. Experience also teaches that when it is necessary to remove what is often called for clinical convenience the "uterine appendages," it is wise to remove the uterus also, because the uterus without the ovaries and tubes is not only a useless organ but becomes the seat of profuse and irregular bleeding.

My experience in such conditions leads me to believe that when it is advisable to remove the uterus in cases of chronic salpingitis, the needs of the patients are usually satisfied with a sub-total hysterectomy. No routine method can be usefully followed. In some instances I have removed the tubes and ovaries, hoping that the uterus would not cause trouble. In many instances, when our hopes were not realised, I have removed the uterus by the vaginal route a year or more after the primary bilateral oöphorectomy. The ill-effects of septic endometritis and neglected gonococcal infections furnish many patients for gynecologists.

In order to give some notion of the relative frequency and variety of infective conditions of the Fallopian tubes and ovaries usually classed in hospital reports as "diseased uterine appendages," I chose one hundred consecutive operations from my case

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reports at the Chelsea Hospital for Women. They are classed thus :

Salpingitis	49 Cases.
Pyosalpinx	31 „
Hydrosalpinx	10 „
Tuberculosis	8 „
Ovarian Abscess	2 „

In order to give some idea of the risks to life from operations for the removal of the Fallopian tubes and ovaries for the various forms of salpingitis, I gathered the following facts from the hospital reports prepared by the registrar. During the years 1903-7 (both years inclusive), "diseased appendages" were removed from 287 women : of these four died.

During thirteen years in which I filled the post of surgeon to the hospital I performed the operation for the removal of the uterine appendage for infective disease and its consequences on an average about twenty times yearly. I lost one patient during this period ; this death occurred in 1902.

The chief risks of such operations are undetected injuries of the rectum, and septic peritonitis when the streptococcus is present in the tubes in acute cases.

The removal of the uterus when the tubes are removed does not increase the risks of the operations, and the ultimate condition of the patient is better.

Salpingitis complicating Cancer of the Uterus.—The Fallopian tubes are often found distended with pus in association with all forms of cancer of the uterus, also when the uterine cavity is filled with pus (pyometra) and when the uterus contains a septic submucous fibroid.

In each of these three conditions death is sometimes caused by the rupture of a tube filled with pus. The leakage of septic pus sets up peritonitis, which is rapidly fatal. Under such conditions treatment is rarely of any avail, whether medical or surgical.

Cancerous masses in situations where pyogenic micro-organisms have access to them rapidly putrefy in consequence. In the case of the uterus this leads to septic infection of the endometrium, which rapidly involves the tissues of the Fallopian tubes.

JOHN BLAND-SUTTON.

PREVENTIVE TREATMENT OF SALPINGITIS.

A LARGE amount of patient labour has been expended on investigating the bacteriology of infective diseases of the internal genital organs of women. The results are of interest and of great importance. The varieties of micro-organisms found in the genital passages are numerous, but the chief are the gonococcus, streptococcus and the tubercle bacillus; each affects the tissues in a different way.

Gonococcus Infection.—This attacks mainly the mucous membrane, and is more destructive to function than to life.

Streptococcus Infection.—The micro-organism flourishes best in loose connective tissue. When this tissue is vascular, as in the neighbourhood of the uterus, the streptococcus invades the blood-vessels and lymphatics. It gains access to this tissue through breaches of continuity in the uterine tract, the consequences of childbirth, miscarriage, and especially criminal abortion. This virulent micro-organism is especially destructive to life.

Tuberculosis.—This usually reaches the tubes in an indirect way. The infection, in many cases, is primary in the intestines, and the peritoneum becomes infected from intestinal ulcers or from caseous glands. The micro-organisms are carried into the mouths of the Fallopian tubes by the lymph currents of the abdomen.

In many instances these three forms of infection produce distinct results and leave such legible marks on the pelvic reproductive organs of women that they are easily read. At times the signs are complicated with secondary infections, such as *Bacillus coli*, pneumococcus, staphylococcus and *B. pyocyaneus*.

When virulent micro-organisms invade the internal genital passages, it is difficult to hinder their destructive effects; but a study of the matter indicates clearly that prevention is better than cure. Sexual hygiene is the remedy against the mischief of the gonococcus, and antiseptic midwifery should be the powerful foe of the streptococcus. As far as we have gone at present with the tubercle bacillus, effective milk sterilisation appears to be the best prophylactic.

JOHN BLAND-SUTTON.

PAPILLOMA OF THE FALLOPIAN TUBE.

WARTS sometimes grow from the mucous membrane of the Fallopian tube; they are sometimes seen sprouting from the inner walls of a hydrosalpinx, especially in that part of the sac which corresponds to the ampulla of the tube. Occasionally the walls of such closed and distended tubes are thickly crowded with soft dendritic warts. The fluid found in tubes containing soft warts is coffee-coloured. It is important to remember this, for I feel sure that some cases reported as examples of bilateral cancer of the Fallopian tubes, the epithelial growth in the tubes was really papillomatous and non-malignant.

Papilloma of the tube would scarcely call for comment under the head of treatment were it not for the fact that, when a Fallopian tube becomes stuffed with soft warts and its ostium remains unoccluded the fluid from the tube irritates the peritoneum and causes hydroperitoneum. Doran published a remarkable case illustrating this fact. A woman, aged fifty, was repeatedly tapped for ascites and large quantities of fluid withdrawn. Eventually a tumour was recognised in the pelvis. This, after removal, proved to be a Fallopian tube distended with papillomatous tissue. The patient was in good health twenty-three years later.

When a tube is stuffed with warts and the cœlomic mouth occluded, the fluid exuded from the warts enters the uterus and escapes by the vagina. Sometimes a sero-sanguineous fluid escapes in this way in large quantities. In some carefully observed cases of this kind removal of the papillomatous tube stopped the discharge of fluid. It is a significant fact that papilloma of the tubes occurs almost exclusively in patients with a history of salpingitis. The faculty possessed by gonococcal discharges to produce warts is a very ancient observation.

JOHN BLAND-SUTTON.

TUBAL PREGNANCY.

(See Complications of Pregnancy, p. 78.)

TUBERCULOUS DISEASES OF THE FALLOPIAN TUBES.

It seems strange, but it is a fact, that tuberculous disease may attack the Fallopian tubes and the rest of the internal genital organs, the uterus, ovaries and broad ligaments, may escape the infection. It is necessary to appreciate this, as it has an important bearing on treatment. It is also true that in some instances the disease may spread from the tube and involve the ovary or the uterus. Primary tuberculous infection of the uterus is uncommon and rarely implicates the tubes. Primary tuberculosis of the ovary is extremely rare, and I have not seen tuberculous disease in the ovary unaccompanied by the same disease in the tubes.

Tuberculous affections of the tubes are often found in women dying from tuberculosis in other organs, especially the lungs. In such cases it is rare for the tubal conditions to cause symptoms.

The cases which come under the care of the gynæcologist are those in which the presence of tuberculosis is rarely suspected. The method by which the tubes are infected has not been adequately explained, but the clinical aspects and the methods of treatment are well understood.

It was pointed out in the section on acute infective salpingitis that the disease usually induced the closure of the cœlomic ostium and retained the infective material within the lumen of the tube, whereas if this mouth remained open the material leaked into the pelvis and infected the peritoneum. The same conditions occur in connection with tuberculous salpingitis.

The leaking form with unclosed cœlomic ostium will be considered first. The leakage and the consequent infection of the peritoneum cause effusion of fluid; this leads to enlargement of the abdomen, which is clinically regarded as hydroperitoneum or as an ovarian cyst. Operative measures are undertaken, the fluid withdrawn and the diseased tubes removed. In some of these cases where the physical signs strongly resemble those set up by an ovarian cyst, if the abdomen is carefully opened, the surgeon may find the fluid enclosed in a capsule. This is common when the effusion is small in quantity. I have removed a gallon of fluid from such a capsule, and demonstrated the widely opened mouths of the Fallopian tubes communicating directly with its interior.

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The localised collections of fluids in the belly, which were often termed "encysted dropsy" in text-books of medicine written thirty years ago, were probably encapsuled collections of tuberculous fluid. Fortunately, when this fluid is removed, the tuberculous tubes excised, and the pelvic cavity drained, a permanent recovery may be expected.

The most convincing case of recovery after the evacuation of a tuberculous ascites which has come under my observation is worth recording. A woman was submitted to cœliotomy for abdominal swelling; much fluid was evacuated. The uterus contained a fibroid as big as an orange; the tubes were enlarged, and the surgeon believing the condition to be due to tuberculosis did not interfere with the pelvic organs; he contented himself with the thorough removal of the ascitic fluid. Some years later the patient was brought under my notice with a tumour in her hypogastrium as big as her head. I had no doubt it was a uterine fibroid and succeeded in performing hysterectomy. The operation was hampered by two thick Fallopian tubes closely adherent to the back of the uterus and to each other. Subsequent examination of the tubes showed that they were stuffed with caseous matter, some of which, as it exuded through the ostium, had become encapsuled. The tissue of the tubes was carefully examined for tubercle bacilli, but in vain. Some of the caseous material was injected into rabbits without harm to them. The patient recovered from the hysterectomy and was in good health three years later.

An important fact is illustrated by this case. When infective material containing micro-organisms is tightly enclosed in the Fallopian tubes, in consequence of the closure of their ostia, the bacilli die and the enclosed fluid, or paste, becomes sterile. This is true of tuberculous matter.

It has been urged that in operating upon patients with tuberculous salpingitis that it is wise to remove the uterus with the tubes. I do not think this should become a routine practice. Patients with this disease are usually between fifteen and thirty years of age. I have satisfied myself that in many instances the disease is confined to the tubes and rarely extends to the uterus. When the cœlomic ostia are occluded, tuberculous tubes sometimes become elongated like sausages; it is easy to remove such tubes and leave the ovaries and uterus. I have watched cases treated in this way, and the patients have reported themselves in good health eight and ten years subsequently.

Observation in the post-mortem room teaches that tuberculous

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salpingitis tends towards a spontaneous cure. Experience in the operating theatre indicates that when tuberculous disease of the tubes leads to infection of the peritoneum accompanied by hydro-peritoneum, or the tubes become so large as to be easily appreciated on vaginal examination, or, more rarely, rise into the hypogastrium and simulate ovarian tumours, operative treatment is demanded, and it is usually followed by good results. In some instances where the disease has implicated adjacent coils of bowel the convalescence has been complicated and greatly protracted by a fæcal fistula. In such apparently hopeless cases diligent and devoted nursing has been rewarded with success even when the illness has been inordinately prolonged.

JOHN BLAND-SUTTON.

DISEASES OF THE BROAD LIGAMENTS OF THE UTERUS.

THE chief diseases of the broad ligaments, apart from pelvic cellulitis and abscess, are: Thrombosis of the uterine and ovarian veins; effusions of blood; tumours, such as lipomata, myomata, sarcomata, and echinococcus colonies (hydatids).

HYDATIDS OF THE BROAD LIGAMENTS.

THE loose subperitoneal tissue is an ideal situation for the cystic stage of the echinococcus; many examples of echinococcus colonies growing between the layers of the broad ligaments have been reported; as a rule, they form part of a general invasion of the abdomen. Hydatids in the broad ligament are liable to communicate with the vagina, bladder or rectum, and the smaller vesicles, accompanied with shreds of hydatid membrane, escape with the urine or fæces. Such communications lead to septic infection of the cysts and all its evil consequences; sinuses form in the groin, and the patients die from the prolonged and exhausting suppuration.

The only treatment available consists in opening up the suppurating cavities, clearing out the vesicles, and, when possible, thoroughly removing the mother cyst. The cavity is then drained, encouraged to granulate and close. These cases require prolonged and assiduous care, with the strictest attention to antiseptic details. The convalescence is very protracted. In cases where the connective tissue of the pelvis, and in some instances the pelvic bones, are honeycombed with cysts, the complete extirpation of the parasitic tissues is impossible. Further, if all the visible cysts are removed, there are microscopic cysts which continue to grow and give rise to trouble later on.

In some fortunate instances the cysts are so localised that a complete removal is possible. Thus, in a remarkable case reported by Doleris, the Fallopian tubes of a woman, thirty-two years of age, were so stuffed with echinococcus vesicles that they formed a large

tumour reaching above the umbilicus. The mass weighed 2 kilogrammes. It consisted of two tubes coiled upon themselves like small intestines, and so elongated that one measured 57 and the other 53 centimètres. These tubes were successfully removed.

Maloney described the case of a girl, fourteen years of age, who had an echinococcus colony in her liver and one on the fundus of the uterus; the latter had communicated with the Fallopian tube and the vesicles had entered its lumen, greatly distending and throwing the tube into convolutions.

It is worth remembering that echinococcus colonies growing in the connective tissue tracts of the pelvis sometimes complicate pregnancy to such a degree as to seriously interfere with its successful termination. An echinococcus colony growing in the broad ligament offers an insuperable obstacle to the transit of the fœtus, and this is true of one growing in the great omentum but occupying the pelvic cavity. In such circumstances Cæsarean section becomes a necessity. The records of ten cases are available in which a hydatid cyst complicated delivery. In the majority of the cases the nature of the obstruction came as a surprise in the course of an operation. In two the patients had been previously subjected to operations for abdominal hydatids, and so the nature of the obstruction was suspected.

In the pre-antiseptic era of surgery, interference with such cysts was calamitous. Since 1900 about half a dozen successful cases have been published.

JOHN BLAND-SUTTON.

THROMBOSIS OF THE VEINS OF THE BROAD LIGAMENTS.

THE veins in the broad ligaments are large and numerous as anyone may satisfy himself by attending a Cæsarean section or watching the removal of a uterus which contains a large fibroid. The veins communicate with the iliac system of veins, and also open directly into the ovarian veins.

In septic conditions of the uterus pathogenic micro-organisms invade the veins in the broad ligaments, extend into the iliac veins and into the ovarian veins, producing extensive thrombosis. The same conditions sometimes arise after operations for the removal of the uterus, ovaries and Fallopian tubes, or the enucleation of tumours and cysts from the broad ligaments.

There are two serious risks to life when the pelvic veins are filled with septic clot, namely, pyæmia and pulmonary embolism.

Intravascular clotting of blood during life is due to the action of pathogenic micro-organisms and the toxins which they breed. After the blood has clotted the growth of micro-organisms will liquefy it, and small portions of clot, colonised by bacteria, are detached and carried away as emboli by the blood stream to lodge in distant organs and establish secondary foci of suppuration. The colonisation of blood with micro-organisms causes thrombosis. Rigors which are such common accompaniments of acute septic processes.

When a large piece of blood clot is detached, it will be carried through the cavities of the right side of the heart and impacted in a branch of the pulmonary artery. When the movable clot or embolus is large enough to plug one of the main divisions of the pulmonary artery, the patient sometimes dies in a few minutes.

Attempts have been made by bold and enterprising surgeons to save patients even in these desperate conditions. Trendelenburg is the pioneer of this class of operations. Realising that the infected blood clot enters the general circulation from the iliac and the ovarian veins, he suggested and carried out the ligature of these venous trunks. In one case the operations were carried out successfully by him. Other surgeons, Michels, Bumm, Cuff and Lendon, have had successes.

The chief difficulty is the selection of suitable cases. Experience

teaches that operative measures in cases of acute metastatic septicæmia are not to be recommended. The best results have been attained in the chronic form of the disease, where the thrombosis was limited to the ovarian veins. In such cases, if the surgeon decides on operation, the abdomen should be opened by the median sub-umbilical incision, as this permits the thorough examination of the pelvic organs, allows the surgeon to ligature one or both ovarian veins, and permits the drainage of pus or serum which may be present in the recto-vaginal pouch.

This method promises good results in the future when experience teaches us the kind of case suited for this mode of treatment.

In other cases where such measures are inapplicable great good follows the use of a vaccine. Steps are taken to determine the nature of the infecting micro-organism by examining the blood or the discharges and preparing a culture. When there are two or more species of bacteria or cocci present, the surgeon must not be discouraged if it be necessary to prepare cultures of two micro-organisms or mixtures of such cultures before the rigors cease. Admirable results have followed the use of vaccines in these distressing conditions.

JOHN BLAND-SUTTON.

TUMOURS OF THE BROAD LIGAMENTS.

In addition to tumours of the ovary, uterus and parovarium, others arise from the connective tissue of the broad ligament, and so simulate ovarian and uterine tumours that accurate diagnosis is impossible.

The treatment is conducted on similar lines. The chief tumours arising in the broad ligaments are lipomata; these masses of fat sometimes weigh several pounds, and are easily enucleated. Tumours similar in structure to uterine fibroids arise from the connective tissue of the broad ligaments. Such tumours are usually bilateral, and are of such size that their successful removal usually entails extirpation of the uterus also. Many of these tumours weigh upwards of 20 lb., and their removal is occasionally a formidable proceeding. Fortunately they can be easily enucleated from their capsules, and this saves the surgeon much anxiety in regard to the ureters. In all operations on the broad ligaments great care must be exercised to avoid cutting, clamping, or applying a ligature to these important ducts.

JOHN BLAND-SUTTON.

PELVIC CELLULITIS.

BEFORE dealing with the details of the treatment of this affection a few words on its diagnosis and general incidence are necessary.

As regards the latter, it is necessary to premise that pelvic cellulitis as an uncomplicated and separate entity is a disease of very infrequent occurrence. The statements made in the past as to its relative frequency have been entirely disproved by the experience of abdominal surgery, and there is no comparison between the frequency of its occurrence and that of the intra-peritoneal variety of pelvic inflammation with which it has been so often confounded.

T. Wilson¹ states that in 1902 cases of pelvic inflammation seen by him a diagnosis of pelvic cellulitis was made in 118, or less than 10 per cent., which is in accord with the experience of other observers.

The diagnosis between the two conditions is, however, by no means easy, and is said by many writers to be practically impossible; it is certainly difficult, and the clinical facts on which reliance was formerly placed have been shown from a diagnostic point of view to be unreliable.

At the same time, there are certain clinical phenomena which, although not pathognomonic, and therefore not to be absolutely depended on, will give some indication as to whether a case of pelvic inflammation is intra- or extra-peritoneal in those cases in which the affection is acute or subacute in character. In chronic cases the difficulty is far greater, since the phenomena alluded to may be almost, or entirely absent.

Any case of acute or subacute pelvic inflammation may be either (1) entirely intra-peritoneal, (2) both intra- and extra-peritoneal, or (3) entirely extra-peritoneal. The symptoms produced vary to some extent according to the degree to which the peritoneum is involved. Every case of intra-peritoneal inflammation, if acute or subacute, is associated with some symptoms of general peritonitis. Some amount of abdominal rigidity, distension, and muscle-guarding, with pain and tenderness, fever and accelerated pulse, are almost invariably present; vomiting and constipation often accompany these. The degree in which any one or more of these

"abdominal" symptoms is observed depends on the extent and acuteness of the peritoneal inflammation.

In a case in which the cellular tissue alone is involved the "abdominal" signs are usually absent, or at the most ill-marked, the pain is less severe, abdominal tenderness and rigidity are absent, and muscle-guarding is not produced except on deep palpation. The physical signs of inflammatory exudation are not very reliable, as it is extremely difficult to differentiate between a cellulitis of one side and a mass consisting of intra-peritoneal exudation, matted appendages, and intestine.

In the latter, however, there are present in nearly all cases the so-called "abdominal" signs. In the former they are either quite ill-marked or entirely absent.

As to the pathology of this affection, it should be stated that pelvic cellulitis is not an inflammation of the connective tissue itself in the first instance, but in reality a peri-lymphangitis affecting primarily the lymphatic vessels and the interspaces in the connective tissue which they drain, which, in its chief characteristics differs in no respect from cellulitis occurring in other parts of the body. The swelling, which is its chief symptom, is, just as in other parts of the body, the result of increased vascular supply, and the exudation is produced by the attempts of the corpuscular elements of the blood to neutralise and destroy the infective organisms, which attempts frequently end in suppuration. Also it must be remembered that the cellular tissue of the pelvis differs from that in other parts of the body, inasmuch as it is not covered by densely attached fascial planes, but by the peritoneum, which invests it more or less loosely, and is easily separated from it, while its outer limit is formed by the bony walls of the pelvis.

It is said to be impossible for a pelvic cellulitis to occur without an accompanying localised peritonitis. This statement should not be accepted without some qualification. It is quite true that in the majority of cases the two affections are present together, but this is due to the fact that a simultaneous double infection has occurred, rather than to a simple extension from cellular to peritoneal tissue; moreover, the tendency is for the exudation to remove mechanically the peritoneum from the focus of infection.

The treatment, therefore, must be conducted on the same broad lines as apply to a similar affection in other parts of the body, bearing in mind that the parts involved are difficult of access, complicated in their anatomical relations, and consequently that active treatment wrongly or unskillfully applied may produce the most unfortunate results.

The Treatment of Pelvic Cellulitis, when the inflammation is confined to the cellular tissue alone, uncomplicated by inflammation of the peritoneum which covers it, depends, for the most part, on the degree of acuteness of the inflammatory process. In addition to this the actual primary cause of the inflammation may modify the treatment called for very considerably.

It is obvious that an acutely infective septic process with rapid sloughing and disintegration of the connective tissue, arising as the result of a septic puerperal infection of a virulent character, will call for widely different methods from those necessitated by an inflammation in which the infective process is of only moderate virulence, insufficient to be destructive, only capable of producing swelling and œdema of the connective tissue, and very possibly terminating in resolution without producing any very marked alteration in the anatomical conditions.

Again, the cellulitis produced by the extension of chronic inflammation from neighbouring structures, such as the pelvic bones, bladder or bowel, requires to be dealt with on lines which differ both in their details and in the activity of the treatment.

The treatment of this affection in cases in which the infection is either subacute from the first, or the relics of an acute infection of the uterus which has been dealt with to a certain extent successfully but not entirely cured, demands very different procedures.

In the early stages the exudation may be accompanied by a certain amount of aching pain, sense of weight in the lower abdomen and tenderness on pressure. These symptoms, however, do not as a rule call for energetic measures. After cleansing the uterine cavity to prevent further infection, regular hot douching or continuous irrigation of the vagina will probably relieve the more immediate discomfort. Free purgation will also assist in relieving congestion.

As regards the swelling itself, the question will often arise as to whether it should be treated by operative measures or not, a problem not always easy to solve.

As an indication of the lines on which to proceed, a *differential blood count* will often be found of great value. It has on more than one occasion been found that a decision *not* to operate in the absence of a marked leucocytosis has been followed by the resolution of the swelling and the recovery of the patient, while on the other hand in cases in which a blood count had not been made the broad ligament has been opened without finding pus.

With regard to the question of leucocytosis as an indication for operative measures, it must be borne in mind that most of the cases

referred to occur in connection with pregnancy or the puerperal state. These conditions are normally attended by a moderately well-marked leucocytosis, so that the normal figure for the leucocyte count in these cases should be raised from 7,000 to 10,000 or 11,000; a marked increase beyond these figures, however, may be taken to be fairly indicative of the presence of pus.

During the puerperal state the leucocyte count tends to fall progressively, and this also takes place as the septic symptoms subside. A progressive increase in the proportion of leucocytes is therefore to be looked upon as indicating septic trouble, as is, in a lesser degree, the fact that the leucocytosis remains stationary.

To be of value the count must be differential, since its diagnostic value depends as much on the numerical relation of the different varieties of white cells to one another as on their total enumeration.

A percentage of 80 to 90 poly-morphonuclear corpuscles, with a definite leucocytic increase, makes the presence of pus very probable if all the disturbing factors previously mentioned have been properly weighed.

A very marked increase in the leucocyte count will be found, as a rule, associated with streptococcal infection; but in chronic cases, especially in those secondary to tuberculous disease of the retro-peritoneal glands or pelvic bones, no increase may be found in the general count, but a proportional excess of lymphocytes occurs. A high leucocyte count, again, may be taken to indicate the presence of virulent pus, and this from an operative point of view is of very considerable importance.

The symptoms are often severe and much pain may be present in that class of case in which a moderately acute infection is present; the swelling commences at one side of the uterus gradually extends to the utero-sacral ligaments, the broad ligament of the opposite side, the tissues lying between the uterus and bladder and not infrequently those lying beneath the peritoneum covering the bottom of the pouch of Douglas. The uterus is fixed and acutely tender, and the whole of the vaginal vault may appear to be almost solid from the presence of exudation, vesical and rectal tenesmus may be marked, the temperature high and the pulse rapid.

It is always difficult in these cases to decide as to the activity of the measures to be used; it is generally the better plan to relieve the more urgent symptoms for the time by giving opiates to relieve the pain, and strychnine and quinine and other tonic drugs to increase the patient's resisting powers. If the uterus is not large, and there is no bloody or foetid discharge, it is better to wait until

the course of the affection shows whether resolution is to be expected, or whether suppuration, necessitating the opening of an abscess, is to be the termination.

In the absence of definite softening and fluctuation, it is well to await definite indications before proceeding to the use of operative measures. Hot douching, the application of fomentations, free purgation, the use of morphia in small doses to relieve pain, and counter-irritation by painting the vaginal vault with iodine, combined with the use of anti-streptococcus serum, will frequently tide the patient over the more acute stages until resolution occurs or evidence of suppuration becomes definite.

In the absence of any direct evidence of persisting infection, the uterine cavity should not be interfered with, except by the giving of intra-uterine douches, and as even this procedure is often acutely painful, it should not be persisted in or repeated too frequently. The most unpromising cases will go on to resolution and recovery if treated perseveringly by expectant methods.

Some caution, however, is needed in the use of opiates, especially if the symptoms of pain, etc., persist over a long period, since the morphia habit is not seldom acquired by these patients.

Suppuration occurs in from 40 to 50 per cent. of cases of cellulitis, and is often difficult to recognise. It is usually indicated by a recrudescence of fever after this has subsided, or is in process of subsiding; the exacerbations of temperature are of a hectic type, the excursions being wide, and in the intervals between the febrile attacks the temperature and pulse fall to near normal.

Operative treatment in cases of pus formation is necessary sooner or later, but should not be undertaken unless there is some definite indication of the locality of the abscess, and this in the early stages is often slight. The choice of route is of no small importance. Some operators, following Lawson Tait and many American writers, advise that these cases should be treated by laparotomy, although qualifying this to some extent by advising waiting until the swelling is in contact with the abdominal wall. It is very questionable whether abdominal cœliotomy under these conditions is the proper treatment. It has been pointed out that since the majority of these cases are of streptococcal origin, and that the organisms retain their virulence for quite a long period, the risks of a streptococcal peritonitis being set up are by no means remote, and as in addition the mass of exudation is extra-peritoneal, its removal is impossible.

The duration of the virulence of the infective organisms varies very considerably, and in a large number of cases has been shown

to be persistent over a long period. A high leucocyte count, as already mentioned, is an indication of this, and when this feature is present it is certainly not wise to deal with the condition by abdominal cœliotomy. If it should be decided to approach the suppurating area by abdominal incision, this is better done by the retro-peritoneal route, as in the operation for ligature of the iliac vessels. In general it will be found that delay is not attended by very urgent symptoms; although the temperature may rise considerably at night, if the patient's tongue remains clean, the pulse is only moderately increased in frequency, the appetite good and abdominal symptoms absent, waiting will not endanger her ultimate recovery, and gives a greater chance of the contents of the abscess becoming sterile and inactive. Sooner or later the abscess tending to point upwards will make its way to a position in which it can be dealt with without opening the peritoneal cavity. At the same time delay in cases in which the pus tends to track anteriorly if carried too far may lead to the abscess bursting into the bladder, serious results, in the shape of prolonged suppuration and the possibility of an infective cystitis and secondary infection of the kidney, supervening. The writer has met with one case in which lardaceous disease supervened in the course of a prolonged pelvic suppuration of this kind with fatal result.

Those cases in which definite bulging into the vagina with fluctuation indicates that the abscess is pointing towards the vagina are dealt with without great difficulty. After a preliminary aspiration to prove the presence of pus the vaginal mucous membrane is incised, and a pair of blunt sinus forceps pushed along the puncture into the abscess cavity and opened to allow the pus to escape. A drainage tube is then passed into the abscess cavity, through which the cavity can be washed out if desired with some antiseptic solution or sterilised water. The opening of the abscess should always be done with great caution, and a blunt instrument used, since it is quite possible to injure one of the large vessels in this region, the hæmorrhage from which may cause considerable danger to the patient and trouble to the operator. This risk cannot be entirely obviated by the use of blunt instruments. In one case of the writer's a large vein in the broad ligament was lacerated by the sinus forceps, and the bleeding, although temporarily arrested by plugging, necessitated a laparotomy before it could be completely stopped and the patient placed in a condition of safety.

If, as very frequently happens, symptoms of suppuration occur without any clear indication of the presence of pus being

evident on vaginal examination, it is usual for the pus to track upwards and for the abscess to point eventually in the region of Poupart's ligament; this is indicated by gradually increasing difficulty in the extension of the thigh of the affected side, which tends to become more and more flexed. At last a fluctuating point can be made out close to Poupart's ligament. When this is recognised the skin should be incised, a pair of sinus forceps passed into the fluctuating area, and the evacuation of the pus followed by the introduction of a drainage tube, which can be passed quite deeply into the pelvis. If the abscess cavity can be defined by passing a pair of curved forceps downwards until its point can be felt in the vagina, a counter-opening can be made, and either a second drainage tube inserted or one long tube carried right through from the opening in the groin to that in the vagina. The evacuation of the abscess is usually followed by rapid relief of the symptoms and the recovery of the patient, although, in some cases, a troublesome sinus may remain for some time.

It must not be forgotten that the uterine appendages may be affected concurrently, and of this the following is an instance: A multipara developed a cellulitis on the right side, which apparently underwent resolution, as shown by the evidence of vaginal examination. The occurrence of febrile disturbance of a hectic type and some difficulty in extending the right thigh gave rise to the suspicion of the formation of an abscess, and in due course a swelling appeared towards the junction of the middle and outer thirds of Poupart's ligament, which was opened and drained. Febrile symptoms persisting, a pair of sinus forceps was passed into a swelling which was evident on the right side behind the track of the drainage tube without, however, evacuating any pus. Six hours later the patient had well-marked general peritonitis, her abdomen was opened, and it was found that the forceps had passed into an abscess of the right ovary, allowing the pus to escape into the peritoneal cavity. After removal of the ovary and free drainage of the peritoneal cavity, the patient recovered.

The treatment of those cases in which pus has formed differs again according to the amount of pus formed. The ordinary surgical maxim of evacuating pus whenever present should be followed, but with certain limitations. The presence of pus is generally suspected long before its presence becomes manifest to the touch, and it is, on the whole, safe to wait until this manifestation is definite before attempting the evacuation of the abscess for reasons already stated. There is, however, a class of case in which a

procedure advocated by the late Professor J. Taylor will be found advantageous. In cases in which the previous existence of a cellulitis had been recognised, and symptoms indicating the presence of pus in the shape of temperature of a hectic type and leucocytosis were present, he advocated the opening up of the broad ligaments after separating the anterior vaginal wall from the cervix. This, in his experience, led to the discovery of a few drops of pus in the neighbourhood of the vessels, and the drainage of these areas by gauze wicks generally resulted in the rapid recovery of the patient.

Those cases in which the inflammation is of an acutely virulent nature from the first should be looked upon as to a certain extent analogous to a case of extravasation of septic urine in the perineal tissues of the male. Prompt incision of the affected areas through the vagina, and drainage and irrigation to remove shreds and sloughs is the first step called for. This should be accompanied by an endeavour to secure the checking of the infection at its probable source by the evacuation and cleansing of the uterine cavity.

The incision of the affected area is a matter that is not by any means devoid of danger; it is quite possible to open the bladder, to damage the ureter, or to open a large vessel, with the gravest results to the patient, and whatever the method of intervention it should be carried out with the greatest care, and an intelligent anatomical appreciation of the position of the structures involved.

The safest method of opening up the broad ligaments is not to attempt to incise them through the lateral vaginal vault, but to separate the anterior vaginal wall from the cervix in front, and then to work round the sides of the cervix until the base of the broad ligament is recognised, and pass a moderately blunt pair of forceps in the direction of the swelling. It will generally be necessary to open up both broad ligaments, the utero-vesical space and also the utero-sacral ligaments, as all these localities are apt to be affected simultaneously.

When opened, free drainage of the affected areas, their irrigation at frequent intervals with either sterile saline solution, a mild antiseptic, or a solution of peroxide of hydrogen, will probably give good results as regards the purely local conditions.

The posture of the patient is of much importance; the more she is propped up the better will be the drainage, and the greater the chance of her surviving. This condition is always extremely grave, and in the majority of cases fatal, occurring as it does as part of a severe puerperal infection. During the operative

procedures bacteriological cultures should be obtained from the affected parts, since treatment by means of anti-toxic sera may be attained by good results, and should be made use of even before the actual micro-organism is isolated, by using a polyvalent serum. After the isolation of the actual micro-organism, serum or vaccine treatment or both commenced on more definite lines should be tried in addition to other remedies.

Rectal instillation of saline solution will be found most useful, and medicinal treatment, by the administration of strychnine, digitalis, iron, and other tonics, is always indicated, but cannot be depended on to materially influence the course of the case.

The drainage of the abscess cavities formed by the suppuration of pelvic cellulitis, when these have burst into, or been opened from, the vagina, may be dealt with by various mechanical means. The packing of the cavity with sterilised or medicated gauze is one method which may be used but is open to the objection that it does not allow of the washing out of the cavity, if this should be considered desirable, except at those times when the packing is removed and changed. A gauze drain may be made use of without packing, and its introduction and removal will be rendered very much less painful to the patient if the so-called "cigarette" drain is utilised. This is made by enveloping in a piece of green protective or guttapercha tissue a long piece of gauze rolled into a cylinder, and forms a very fairly efficient drain.

An ordinary rubber drainage tube with a cross-piece added to the end within the abscess, or a T-shaped tube may be used.

A double tube of smaller calibre with a cross-piece, made by cutting halfway through a long piece of ordinary drainage tube midway between its ends, and then doubling it over a short piece of smaller tubing, and fixing the two together with a couple of sutures is better than either. In any case the tube should only have lateral openings in that portion within the abscess cavity, and the lower portion should be long enough to reach well outside the vagina. The external orifice should be covered with a pad of antiseptic gauze, and a light pack of sterilised gauze should be introduced into the vagina, so as to surround and steady the tube without compressing it.

The double tube has the great advantage that it allows of the washing out of the abscess cavity at any time if thought desirable.

Sir W. J. Sinclair has devised a very convenient and effective glass tube for vaginal drainage, which is described as the "teal" drainage tube. This tube is shaped exactly like the teat of a baby's bottle, the expanded portion being perforated, while at the

lower end is a flange, which prevents the drainage tube slipping into the abscess cavity. It is possible to attach a piece of rubber tubing to the lower extremity. It has several advantages, in that it does not slip in or out, and being quite short does not tend to produce irritation of the vagina. In all cases in which vaginal drainage is made use of the patient should be sat up to ensure that the pus does not collect in the vagina. These methods of drainage are equally useful in extra- or intra-peritoneal abscess.

Some form of self-retaining tube is a necessity in these cases, since intra-abdominal pressure tends to cause the walls of the abscess cavity to come together when the pus is evacuated, and so cause the tubes to be pushed out.

Anti-streptococcus Serum.—The majority of cases of pelvic cellulitis, occurring, as they do, as the result of puerperal or traumatic infection, have been shown to be due to streptococcal infection.

Chipman² found that the majority of his puerperal cases of this affection were streptococcal in origin, and it is in these cases that the use of anti-streptococcus serum may be found of value.

It is in the pre-suppurative stage that the best results will be obtained from this form of treatment.

It is not of such great value when the symptoms of pus formation have already manifested themselves, as in these cases the infective processes are as a rule already localised. But even in cases of suppuration its use may be continued with advantage.

The initial doses should not be less than 30 cubic centimetres, and the following doses should be of 10 cubic centimetres each once or twice daily. Since some patients show marked susceptibility to this form of treatment, in the form of skin rashes following its hypodermic use, it is sometimes necessary to give the daily doses by the rectum. The possibility of anaphylactic conditions should be kept in mind, and if it is necessary to give additional injections after fourteen days the rectal route is preferable.

Owing to the difficulty of isolating the specific germ in any given case, a polyvalent serum should be used, since the time during which the treatment is likely to be of value is limited, and if the incubation and identification of cultures is waited for, the opportunity of obtaining any good result may be lost.

Even if it should prove that the organism present is not that from which the serum was obtained no harm will result, and occasionally considerable benefit to the patient may result.

Remote Parametritis.—It is by no means unusual to meet with cases of pelvic cellulitis in which the physical signs of the affection

in the neighbourhood of the uterus have entirely disappeared, to be followed after a short interval by signs of the recrudescence of the trouble at some little distance, as, for example, in the iliac fossa or in the neighbourhood of the kidney.

Suppuration may occur and the abscess point in the loin or the locality of the triangle of Petit or along the course of the iliac vessels, under Poupart's ligament or at the saphenous opening. In these cases the abscess should be opened at the point where fluctuation can be most easily detected.

Chronic Parametritis.—If resolution is unusually slow, and instead of the mass produced by the acute attack subsiding, it persists as a hard lump in the neighbourhood of the uterus, or as a swelling of the affected broad ligament, the patient is rendered more or less of a permanent invalid, the unresolved exudation forming a large mass in the pelvis.

When this condition occurs it is difficult to obtain a response to the ordinary methods, and medicinal treatment beyond that which is purely symptomatic is of little avail, although the late Professor J. Taylor has stated that he found these cases considerably benefited by the prolonged administration of small doses of potassium iodide and mercury.

Direct remedies applied to the mass are not of much greater value; mechanical means may prove helpful, and massage properly applied may lead to the gradual dispersion and disappearance of the swelling, but not, however, without leaving some permanent thickening.

Abdominal massage should be first tried with particular attention to the deep manipulations of the pelvic viscera and the upper limits of the mass, if felt without difficulty. If this is well borne and does not produce pain, bi-manual massage directly applied to the mass may be made use of with caution.

As an alternative to this, columnisation of the vagina may be tried, by packing it with sterilised sheep's wool covered with mild antiseptic ointment, and firm pressure made from the abdominal surface by means of a graduated compress and tight binder, or a shot bag. In either case the production of much pain is an indication that this method of treatment should not be persisted in.

The application of both the constant and faradic electric currents has been suggested, but it is not quite easy to see how they act in these cases.

The opening of the mass from the vagina and drainage by means of a gauze-wick would seem a necessary and rational procedure, and has been found to give good results.

It is necessary, however, to proceed with caution and to refrain from the use of sharp instruments in making the opening, except that through the vaginal mucous membrane, since it is by no means easy to diagnose accurately a case of this kind from one in which the mass consists of matted appendages, with possibly adherent intestine contained in the mass. The dangers in the latter case are obvious.

To hasten the absorption of inflammatory thickening, Rudolph³ has devised a method of applying hot air to the cervix, which he has found to have the effect desired, and is, in his opinion, preferable to the use of either hot water or steam, since it is less likely to damage the tissues. He has also suggested the use of Bier's suction method, by means of a glass speculum applied to the cervix with good results.

A similar method has been made use of by Eversmann,⁴ through the medium of a glass speculum closed at one end, to which is attached a small glass tube communicating by a three-way valve with an air-pump. This method, although primarily intended for the treatment of inflammation of the cervix and body of the uterus, has been found by both observers to give good results in cases of thickening of the utero-sacral folds, and it seems reasonable to suppose that its powerful depletive action would give similar results in thickening of the broad ligaments.

Another method of treatment to secure the resolution of chronic inflammatory masses has been suggested by Kirstein,⁵ who has treated several cases by the injection of physiological salt solution into the affected broad ligament; it seems, rather doubtful, however, whether his patients would not have recovered with equal rapidity if the ordinary methods of expectant treatment had been adopted.

The chronic form of atrophic cellulitis is a condition which may call for treatment. Here the peritoneal folds, enveloping the cellular tissue, become shortened and produce distortions and displacements of the uterus, the direction of which depends on the folds affected.

Hubert Roberts remarks that in a chronic affection a chronic cause must be looked for, and in the majority of these cases the affection does not supervene on an acute or subacute stage, although these two latter may ultimately produce similar results. One of the commonest forms is that which produces shortening of the utero-sacral ligaments, with resulting pathological ante flexion and dysmenorrhœa.

The usual cause of this is some ulceration of the rectum

sufficient to cause a gradual development of fibrous tissue, but not enough to produce acute inflammation.

The treatment of this condition consists in treating the ultimate cause, when this can be discovered.

A large proportion of cases occur in the course of some illness, occurring at or before puberty, and in general when the affection has become manifest, the original cause has disappeared and nothing can be done except to treat the symptoms remaining.

No treatment by pessaries is likely to be of the slightest value for the displacements found, and they are best left alone. It is practically impossible to restore the damaged tissues to their original state.

If the condition is discovered sufficiently early, the cure of the primary cause may prevent the further spread of the trouble, but it is not likely to cure the damage already done to the tissues.

A certain proportion of these cases may be due to healed tuberculous disease of either the pelvic bones or glands; but here, again it is impossible to restore the thickened and damaged tissues to their original state.

Massage may do something in the way of removing thickening and stretching contracted tissue, but its results are apt to be disappointing.

Pelvic Cellulitis in Diseases of the Pelvic Bones.—Disease of the bones of the pelvis may give rise to a cellulitis encroaching on the pelvic cavity and forming a swelling apparently approaching the uterus.

It is better, on the whole, not to attack this by the vaginal route unless there is very definite evidence of fluctuation to be made out, as a troublesome sinus will remain, the cause of the trouble cannot be easily reached from within, and further measures will be necessary.

In a case of the writer's the bladder was perforated in the attempt to open an abscess due to this cause, fortunately without ill result, as the opening rapidly closed; some time later a swelling was detected in the groin, which was opened by Hilton's method, and a quantity of pus evacuated. To the operator's surprise, however, instead of the probe introduced to ascertain the locality of the seat of suppuration passing inwards and downwards towards the pelvis, it passed outwards and backwards. The sinus was slit up and a patch of dead bone discovered on the external surface of the ilium, which involved the whole of the thickness of the bone and communicated with the interior of the pelvis.

Vaccine Treatment.—It would seem reasonable to suppose that vaccine treatment may have a field in dealing with cases of pelvic cellulitis; but owing to the time involved in the determination of all the factors, of which a knowledge is necessary for the correct application of this method, it does not seem likely that its value would be great in acute cases. When, however, a definite organism has been isolated and serum treatment is being used, an autogenous vaccine may be administered simultaneously with great advantage.

In chronic cases, however, and more especially in those in which a thrombo-phlebitis with pyæmic symptoms have supervened, this method may be attended with good results. Success has been obtained in the treatment of infections due to the bacillus coli and staphylococcus in chronic inflammations of the pelvic viscera in cases of the former, and in cases of recurring suppuration in the latter. The use of this method, provided the fact of infection can be detected in time, should have the best results in dealing with those cases in which a chronic rectal or glandular infection leads to the development of atrophic varieties of pelvic cellulitis, and should be specially valuable in those cases in which persistence of a pelvic mass is due to a recurrent recrudescence of activity of micro-organisms, whose virulence has subsided without their having become actually sterile. (*See Vaccine Therapy, Vol. III.*)

SUMMARY OF TREATMENT.

The diagnosis of pelvic cellulitis from other varieties of pelvic inflammation is not easy to make with certainty on physical signs alone. In acute and subacute cases a definite history of infection is usually present. The acuteness of the fever is generally out of all proportion to the severity of the other general symptoms.

The acute phlegmonous type demands prompt operative treatment and the measures necessary in dealing with a general septicæmia. It is generally fatal.

Of the less acute and subacute cases approximately 50 per cent. terminate in resolution under expectant treatment, hot douching, depletion and dealing with local sources of infection. The remainder go on to suppuration and the formation of abscess which should be opened and drained when definitely located, but not by transperitoneal methods.

The treatment of subacute cases should be expectant. It is impossible to say in the first instance whether resolution will not occur, and definite evidence of suppuration may generally be waited

for with safety. Frequently repeated leucocyte counts will be of great assistance in determining this.

The resolution of the mass of exudation, when this tends to persist after acute symptoms have all subsided, should be promoted by the use of various local measures, massage, Bier's treatment, and, in some cases, drainage.

WALTER CARLESS SWAYNE.

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DISORDERS OF THE SEXUAL FUNCTION.

DYSPAREUNIA.

DYSPAREUNIA means difficult intercourse, or inability to perform the sexual act without pain. This is usually applied to females. Dyspareunia is found in the recently married, or it may come on at any time. In speaking of the treatment of dyspareunia we must bear in mind the conditions which produce it, for unless we ascertain the exact cause in each case, we are not likely to be successful in its treatment. When a case of dyspareunia presents itself, it is well to have a systematic method of examination, in order to find out exactly the condition. The best method is to examine carefully from without inwards. It will often be found that there is slight or severe vaginitis (catarrhal, granular, membranous or ulcerative), rendering the entrance to the vagina so sensitive that it cannot be touched without causing great pain. Small follicular ulceration may be observed at the orifice of the vagina, or minute excoriations or fissures, which are exquisitely sensitive to the touch; occasionally a caruncle of the urethra is present, and should invariably be looked for, as it may sometimes be so small as to easily escape observation.

The urethra should always be carefully examined to ascertain if it is swollen, red or everted, and the posterior fourchette should also be inspected, for frequently there may be discovered a small patch of ulceration, which is extremely painful to the slightest touch. These external affections are quite sufficient in many cases to prevent any attempt at intercourse, and in others, when not so severe, to render it almost intolerable.

There are various vulvar swellings which produce dyspareunia, such as cysts of Bartholin's glands or of the hymen. Cysts of the vulva may be connected with the round ligament or canal of Nuck. Hernia may be also present, the bowel descending through the canal of Nuck to the larger labium, when it is called hernia labii majoris anterioris, in contra-distinction to hernia labii majoris posterioris, which is very rare. In addition to the foregoing we may find hypertrophy of the clitoris, or a small fibroma of the clitoris or of the labium, producing pain on attempting intercourse. Such affections are usually slow

in growth, and the pain, which at first is not inconsiderable, increases so much that advice is sought concerning it. In addition to benign growths we have to remember the possibility of malignant ones, the most frequently met with being epithelioma. In cases of long-standing pruritus vulvæ or kraurosis, Martin, Jacobs and others have shown that they have a marked tendency to develop into carcinoma. Passing onwards, the vagina itself may be the cause of the pain. It may have a patch of ulceration, or cysts may develop from vaginal crypts.

Hypertrophy of the cervix, metritis, endocervicitis, salpingitis, uterine or ovarian tumours, prolapsed ovaries, or a retroflexed uterus may all cause dyspareunia. Whenever it occurs from inflammatory affections, it is because the parts affected are all sensitive to the touch, and the least mechanical interference produces pain.

One of the commonest causes of dyspareunia is a prolapsed ovary, sometimes both being in Douglas's pouch. The least pressure causes such sickening pain that all attempts at intercourse must be given up.

The treatment consists of dealing immediately with any signs of ulceration about the vulva or vagina which may be present. For ordinary vaginitis a soothing injection may be used, and of the most agreeable is the liquor plumbi subacetatis (1 drachm to 1 pint of water). This may be used night and morning, or more frequently if the inflammation is severe. The temperature may be about 98° or 100° F., or higher if agreeable, but any temperature which the patient finds most soothing may be used. As it is a lead lotion, it cannot be continued indefinitely on account of risk of absorption. In addition to this, much relief is given by the free application to the vulva of an ointment consisting of subnitrate of bismuth, 2 drachms; paraffin ointment, 1 oz.; boracic acid ointment, $\frac{1}{2}$ oz.; and elder ointment, 1 oz. If there is a burning sensation about the vulva and much irritation from discharge, it is very useful to order the parts to be bathed externally at bedtime with warm starch water, enough powdered starch being added to the water to render it the consistence of cream. This can be done the last thing at night and again in the morning, or more frequently if it affords relief. After using the injection of lead in the morning, and if the patient prefers not to use any ointment by day, a finely powdered mixture of zinc oxide, $\frac{1}{2}$ oz.; powdered starch, $1\frac{1}{2}$ oz.; and powdered boracic acid, 1 oz., may be applied freely with wool. When there is a great deal of irritation about the vulva, this is often efficacious.

It is important to be able to change the lotions or injections as soon as no improvement is shown, or any improvement that is gained is not well maintained. Occasionally an injection of boracic acid (10 gr. to 1 oz.) or of weak carbolic acid (1 in 80) may be of service, or an alkaline injection. If there is actual itching or pruritus, nothing gives so much relief as injections of carbolic acid (from 1 in 80, gradually increasing the strength if necessary). Occasionally there is some irritation and smarting of the parts without any ulceration of the surface, and in such cases the following lotion may be of great help: Sod. Biboratis, ʒij; Liquor. Morph. Hyd., ʒss.; Glycerini, ʒij; Aq. Sambuci, ad ʒviij. [U.S.P. R. Sodii Boratis, ʒij; Morphinae Hydrochloridi, gr. 2½; Glycerini, ʒij; Aquam Sambuci, ad ʒviij.]

Sometimes great relief is afforded by covering the affected parts with pellantum, which protects from the air, and generally is cooling and soothing to the irritable parts. It contains about 20 per cent. of zinc oxide. In chronic cases it may be mixed with 3 to 10 per cent. of ichthyol or 5 per cent. of resorcin.

It is of the utmost importance in the treatment of dyspareunia that the patient should have absolute rest from all attempts at sexual intercourse until the parts are restored to a normal condition, and that when it is at first resumed abundance of lubricant should be used.

For a caruncle of the urethra it is best to remove it at once under an anæsthetic. It may be cut away with the scissors, and the Paquelin cautery applied to the base, or it may be burnt away entirely by the Paquelin. After its removal by this method it is most soothing to have some wool, with a solution of cocaine (10 per cent.) applied, and left until the pain has abated. Occasionally there is considerable pain for several hours after the operation. Subsequently the parts touched are treated as ordinary burns.

If the dyspareunia is caused by an inflammatory disturbance of the uterus or tubes, these conditions must be treated. Sometimes a course of hot vaginal douching, the temperature of the water being from 110° to 120° F., night and morning, in addition to glycerine tampons or glycerine ovules, and complete rest, will have a most beneficial effect, if kept up sufficiently long. At the end of ten days or a fortnight there is often marked improvement, but it ought to be continued a considerable time, until all pain has disappeared on making an internal examination. Until this occurs, any attempt at intercourse will be harmful, and followed by disappointment. If an ovary is prolapsed, swollen and tender, the same kind of treatment is excellent. Should there be any rise of temperature, of course the

patient must be kept at rest ; but if the temperature is normal, and she is well enough to go about, a Hodge's pessary will sometimes keep up the ovaries and cure the dyspareunia. In the case of a retroflexed fundus it may be so painful that intercourse is impossible ; but if it can be replaced and kept in position by some suitable support, the patient is cured. Should there be congestion present, and if the fundus is too tender to be moved without an anæsthetic, a course of hot douching and glycerine plugs may be employed before any attempt be made at reposition. It is often of great advantage, whilst the course of douching is going on, to order the patient some saline aperient to be taken every day, the sulphate of sodium, given early in the morning, being one of the best.

The general health ought to be carefully attended to in the treatment of any severe cases of dyspareunia, in addition to local remedies, for it often suffers considerably, especially the nervous system, if the dyspareunia is discovered immediately after marriage, and advice has not been sought promptly. If dyspareunia is caused by any of the above internal inflammatory affections which have become chronic, a course of waters at Franzensbad, Marienbad, Ems, or other watering-places may be of the greatest service, and may be tried before resorting to other remedies.

R. A. GIBBONS.

STERILITY.

STERILITY may be defined as the inability of a man to beget, and a woman to bring forth children. In recent years the knowledge of the causation of sterility has become so much greater than it was formerly, that it would hardly be instructive to discuss its treatment without first briefly mentioning what we know to be some of its causes. The study of the etiology helps enormously towards the treatment, and although I have no intention of entering deeply into the various causes of this affection, it is important to enumerate the more important ones. Formerly, if a man appeared physically sound, and there was no difficulty about the sexual act, it was assumed that he was perfectly normal, and that, therefore, the woman must be at fault. But we now know that *potentia cœundi* does not necessarily mean *potentia generandi*. It is only in comparatively recent years that we have come to know how much men are to blame for sterile marriages, and this is largely owing to the work of Noeggerath, which at first received no attention; it was owing to the remarkable discovery of the gonococcus by Neisser that the views of Noeggerath were accepted. This discovery of the gonococcus explained many cases of chronic vaginal discharge, as well as chronic or incurable discharge from the male. It also accounted for many affections of the pelvis which are found to be so frequently associated with sterility.

Sterility in the woman may be divided into primary, relative and secondary. In primary sterility it is absolute, and by many is said to be congenital. A woman may live for years with her husband, and may be said to be absolutely sterile; the husband may die, she may marry again and become pregnant, so that, according to some, she is relatively sterile, or, in accordance with the views of others, there is incompatibility. In secondary sterility the woman has borne one or more children, and then, for no apparent reason, is unable to beget more children, although the husband remains strong and healthy, and the woman appears to be well.

The main element in the expectation of sterility is *the age at marriage*. According to statistics, the question of whether a woman will be sterile or not after marriage, is decided within three years from the date of marriage, only 7 per cent. bearing after this period. Marriage itself in the very young, from sixteen to nineteen years of

age, is a cause of sterility. The amount of sterility in women is found by counting the number of productive and non-productive marriages of women within the reproductive age from fifteen to forty-five. Different statistics of sterile marriages, collected from different sources, although showing figures which are not quite the same, go to prove that it is fairly accurate to state that in Great Britain the number of unfruitful marriages is one in ten. This shows how important the study of sterility becomes, for we know that the average healthy woman, living in wedlock all her child-bearing life should have ten children, so that one sterile marriage in ten means an enormous loss to the State. An accurate knowledge of etiology, leading to careful treatment, would help to diminish that loss. If the husband is healthy for copulation and procreation, we must remember that the following conditions are necessary in order that fecundation may ensue: (1) Normal ovulation, (2) cohabitation, and (3) opportunity of meeting of the ovum and spermatozoa.

Sterility may always be attributed to defects in one of these conditions. We have no exact knowledge of the normal process of fecundation. Ovulation and menstruation may occur independently; we cannot say if discharged ova are ripe, but we assume that they are in any "sexually ripe" women.

I mention, but have no intention of dwelling on, that form of sterility which is brought about voluntarily by means which are used for the prevention of conception. Nature is an implacable enemy, and frequently punishes for interference with her processes by permanent sterility. It is difficult to explain this in all cases, and I shall not attempt to do so; but I have now seen many cases of sterility following these practices, adopted after the birth of one child, which have been discontinued, because, after a certain number of years, a second child has been desired, and it has been found impossible to beget one. I do not allude to the so-called "one-child" sterility, which is well known, and where, as a rule, inability to conceive may be traced to a puerperal infection, or other causes; but to cases where conception has been deliberately prevented for some years, not by voluntarily living apart, for I have known of many such cases, where there is no reason to suspect puerperal trouble, the one confinement having been perfectly normal, and where there has been absolutely no ground for putting the sterility down to infection by the gonococcus.

The causes of sterility, apart from age, may be divided into structural and functional. It will be easiest to trace the causes of structural sterility in women from without inwards, and I have made the following classification because it appears to be practical:

I. Structural causes: (a) Any condition which causes physical obstruction in the sexual act, such as a tough and unruptured hymen, vaginismus, etc.; (b) affections of the vagina and cervix, as atresia of the vagina, vaginitis, etc.; (c) affections of the uterus and adnexa; and (d) any condition, apart from the pelvic organs, leading to inflammation of the peritoneum, such as appendicitis.

II. Functional and constitutional causes: Incompatibility, dysmenorrhœa, general diseases, underfeeding, alcohol, obesity.

Space does not permit more than a brief reference to these important divisions.

With regard to the vaginal obstruction of an *unruptured hymen* it must be remembered that, although in the vast majority of cases this causes sterility, yet it does not always do so. There are many reported cases in which pregnancy has occurred with the hymen intact.

It is usually thought that polypus of the cervix, as well as uterine fibroids blocking the cervical canal, and flexions of the uterus, give rise to sterility by mechanically preventing the ingress of spermatozoa. This, however, in my opinion, is very doubtful, for where the menstrual fluid passes the spermatozoa can travel. My belief is that in the presence of a mucous polypus or a submucous fibroid it is the secretion of the mucous membrane which is inimical to conception. Any *vaginal discharge* is apt to have a toxic action on the spermatozoa. Nearly all cases of vaginitis are secondary to lesions of the uterus or tubes, and result from the accumulation in the vagina of irritating uterine discharges. The gonococcus is most likely the commonest cause of vaginitis. Whatever be the starting point of catarrhal conditions, or inflammation of the mucous membrane of the vulva, vagina, cervix, uterus, or tubes, the result is more or less continued secretion, which is deleterious, and acts in a toxic manner on the spermatozoa. I believe that, although it takes but a small number of spermatozoa to effect conception, the secretion from the diseased surfaces of any of the above-mentioned parts is sufficiently toxic to immediately kill them. This toxic action of these secretions is probably due to the living organisms they contain, which are antagonistic to the spermatozoa.

In cases of *metritis* and *endometritis* it is quite possible that, owing to the altered condition of the mucous membrane, there is not a sufficiently healthy nidus for the ovum, and that even although spermatozoa do reach it and impregnation takes place, the ovum is immediately destroyed without giving rise to any extraordinary signs. It must also be remembered that *inflammatory affections*

of the tubes have a most important bearing on the whole question of sterility. The tube, at least, must be patent, or the ovum cannot reach the uterus, and the opening of the tube into the peritoneum must be undisturbed. The ciliated epithelium lining the Fallopian tube and uterus is always in action, and as a result there is a continuous stream of fluid passing from the peritoneum to the vagina, and in this stream the ovum is carried when it is discharged from the Graafian follicle. The spermatozoa are working against this stream, and it is difficult to say when the meeting between the ovum and spermatozoa takes place. Extra-uterine pregnancy shows that impregnation of the ovum may take place before it reaches the uterus, and rarely before it reaches the Fallopian tube. It is most likely that impregnation occurs as the ovum passes along the Fallopian tube. We do not know at what rate it travels, but we know that it must take some time for the syncytial buds to appear, by which means the ovum penetrates the mucous membrane of the uterus and is arrested. It is possible that in many ova the syncytial buds may be imperfectly developed, leading to frequent early miscarriages, because, for healthy conception to take place, we must have a healthy ovum as well as healthy spermatozoa and normal mucous membrane. We know that if the ciliated lining of the genital canal is not normal and active, conception does not take place, for the ovum is not moved along by the cilia towards the uterus, and the meeting with the spermatozoa does not occur. This diseased condition of the lining of the tube, causing loss of ciliated epithelium, gives rise to irritating secretion, which may escape into the peritoneal cavity and set up local peritonitis, effectually sealing the tube. A very common cause of sterility, in my opinion, in women, and one which is not apt to be thought of after the attack is over, is *appendicitis*. I believe that attacks of inflammation of the appendix are answerable for the local attacks of peritonitis, which seal up the ostium of the tube, effectually preventing conception. *Gonococcal inflammation* is, of course, extremely common as a cause of sterility in the female, on account of its leading to salpingitis, as well as inflammation of the lining membrane of the uterus and cervix. Whatever be the cause of the inflammation, the result is the same. *Puerperal inflammation*, which largely influences the question of sterility in women and is so often the cause of "one-child sterility," probably leads to the condition by the peritonitis set up, which seals the tubes, or causes salpingitis, with affection of the ciliated epithelium.

It is necessary to mention *diseases of the ovary* as a cause of sterility, but it is remarkable how small a portion of healthy tissue

is required for conception, for the ovaries may be extensively diseased, and yet child-bearing occur. Anything, however, which prevents the rupture and discharge of the Graafian follicle into the peritoneal cavity will bring about sterility, and this condition may be due to a thickening of a capsule, the result of inflammation, however caused.

In the study of sterility in the female there are two matters of great importance which must be referred to. One is that it is closely associated with *spasmodic dysmenorrhœa*, and the other is the relation of the sexual appetite and sexual pleasure. In 332 cases of absolute sterility, that is, excluding all women who have miscarried or borne a child, nearly half suffered from spasmodic dysmenorrhœa. The relation of the sexual appetite and sexual pleasure in those who are sterile must be carefully considered as a whole, and especially as accounting for what is termed "*incompatibility*" as a cause of sterility. It is difficult of explanation, but it is remarkable that a woman may live with a husband for years, remaining sterile all the time, may marry again and immediately conceive, notwithstanding that the first husband was sexually sound. In some of the cases I have investigated I have found that sexual pleasure was absent with the first husband and present with the second. The vagina, uterus and Fallopian tubes, like the intestine, are muscular tubes. During the sexual orgasm there is a co-ordinated action of this muscular tube, which has for its object the helping onwards of the spermatozoa into the uterus. In certain women who are sterile this never takes place, because they never have any sexual feeling. In these cases the sexual centre in the spinal cord, or in the sympathetic system, which should regulate the movements of the genital canal, is either imperfectly developed or is congenitally absent. In many cases of sterility which I have investigated there has been complete absence of sexual desire and sexual pleasure. Yet this absence must be by no means considered to occur only in the sterile. Those who are conversant with these cases know well that this absence occurs in many women who have children. It cannot, therefore, be said to be the cause of sterility, although so frequently associated with it. Moreover, we know that not only may there be complete absence of sexual desire and pleasure, but there may be positive sexual antipathy, and to some the act is absolutely revolting, and yet conception occurs. But, on the whole, it may be said that the absence of sexual feeling is a powerful factor in the causation of sterility.

There are certain *general diseases* which must be mentioned. Any severe illness which produces wasting of the uterus and ovaries

will obviously produce sterility, and a severe labour may be followed by atrophy of the uterus, preventing fruitful conception. Syphilis, tuberculosis, mumps, or any active infectious diseases may bring about sterility. The more important and common causes of changes in the pelvic organs are alcohol and morphia, which act by causing chronic poisoning. They frequently produce amenorrhœa for long periods. With alcohol is often associated obesity, which is so frequently observed accompanying sterility. There can be no doubt that excessive fat interferes with the sexual organs. Out of 251 cases of obesity, Kisch found 21 per cent. sterile. Gebhard associates the changes in the ovaries in obesity with those in the thyroid gland, and supra-renal bodies. Amenorrhœa is often accompanied by obesity. In some cases the gain in weight is rapid, and after the menopause most women increase in weight, as also is the case in the removal of the ovaries before their functional activity is over.

An important cause in some cases of sterility is *profluvium seminis*. It is very difficult to get rid of it, and whilst it is present there is but small chance of conception, but as a minute quantity of seminal fluid is enough for conception, we know that women afflicted in this manner do sometimes conceive.

Sterility in Man.—The causes of sterility in man may be divided into: (1) Conditions which prevent the sexual act; (2) conditions which prevent the development of the spermatozoa, or interferes with its fertilising power. With reference to the first division, we need not discuss it, for it is obvious that if congenital malformations, which I need not enumerate, are present, or such want of nervous force that sexual intercourse cannot take place, no conception will occur. Under this heading must be included incompatibility. I have known some instances of healthy men marrying who were unable to consummate their marriage, and yet who have been sexually strong. I am not now alluding to cases where marriage takes place, and where, from pure nervousness, intercourse cannot occur. Such cases are met with, but, as a rule, although the condition may last for some time, it passes off entirely; but I am referring to those cases, happily rare, where a man, known to be sexually sound, marries, and for some unaccountable reason can never have intercourse with his wife.

The second division is what principally concerns us as causing sterility. According to the accumulated statistics of Kehrer, Gros, Levy (Munich), Balin and others, 26 per cent. of all cases of marital sterility are due to the husband alone owing to azoöspemia, the fluid containing no living spermatozoa, aspermatism and malformations. Balin states that out of 200 men living in sterile union whose

wives showed normal genital conditions, seventy-three were subjects of *azoöspemia*. Cases of impotence and oligospermia are not included in these calculations. In oligospermia, which may come from a chronic vesiculitis, the living elements are few, or they may be absent, though dead ones or those with feeble movements may be found, necrospermia. Oligospermia may occur after sexual excess, and is only temporary. In a certain number of oligospermatics, the condition remains permanent in consequence of congenital disease. The existence of oligospermia depresses, but does not take away the power of, fecundation. As a rule, *azoöspemia* is the sequence of gonococcal disease of the testes. Out of eighty-three men with double gonococcal epididymitis, Liegois found permanent *azoöspemia* on seventy-five occasions, and Finger found it 207 times out of 242 cases. *Azoöspemia* has also been observed in syphilitics. In isolated cases it passes off after the introduction of specific treatment. Frogs' spermatozoa, when frozen and thawed, regain their mobility, but these frozen spermatozoa lose their power of conception.

Torkel doubts whether the mobility of the spermatozoa, which is held to point to the capability for begetting, is a certain index to all cases. It may be that he is right, but up to the present moment I know of no other evidence upon which to go when forming an opinion as to the cause of a sterile union when a woman appears to be healthy as regards her pelvic organs. It is quite possible that some subtle changes may take place owing to disturbance in the circulation, and the introduction into the blood of some substances injurious to protoplasm, and that the spermatozoa, although active, may have lost the power of fertilising the ovum, as in the example alluded to of the frozen spermatozoa of the frog. Dr. Lewis Jones informs me that "in the case of such animals as rats, irradiation by X-rays produces well-marked histological changes in the testes, and an absence of spermatozoa from the semen. In human beings the effect is apparently temporary, but it is a fact that radiographers become *azoöspemic*." The action of the Röntgen rays is a corrosive one, to which the non-resisting elements, in this case probably the spermatocytes and spermatids of the seminal tube, are the first to be sacrificed, and are prevented from developing into spermatozoa. Radium may possibly act in the same manner.

It is well known that with highly organised cells, spermatozoa and ova being the most highly organised of such, harmful influences which last but a short time may have the most severe consequences. It is certain that gonococcal inflammation, which is the most

fruitful source of azoöspemia, cannot affect all in the same way, and it is not yet known how long the effect of an attack of gonorrhœa with reference to the spermatozoa may last. For we know how common this disease is, and how soon it may pass off in some. It is possible that it is only in the most severe cases that the structure of the testes is permanently attacked, causing azoöspemia for many years, or perhaps indefinitely. A sudden attack of orchitis, even though it may last but a short time, may have such influence on the secreting structure as to permanently damage it, notwithstanding that the gland is to the naked eye and to the touch normal in all respects. It is unnecessary to quote many statistics, but I may briefly state that Balin found among 188 husbands of women with healthy genitals living in sterile union ninety-seven had without doubt, suffered from gonorrhœa. Badeler found blame attaching to the husband in 70 per cent., and Lier and Ascher in 40 per cent. of sterile marriages. It must not, however, be assumed that because the gonococcus is so frequently found in cases of sterility its presence is always followed by those conditions which preclude conception.

Treatment.—Although I have intended to discuss sterility as the inability of a married couple to bring about conception, and have therefore mentioned the causes affecting the husband, it is not my intention to dwell upon the treatment for sterility in the male. I may merely mention that in the scheme for thoroughly going into the causation of a sterile marriage the possibility of the husband being at fault must be borne in mind. In every case of sterility which comes before me, if, after thorough examination of the wife, I consider it advisable to have the husband examined, I recommend that this should be done by a bacteriologist. I say that I do this if I think it necessary, for in many cases of sterility in which one is consulted, it is undoubtedly the fault of the woman, which is proved by the fact that conception follows treatment.

It is well to ascertain whether there is any difficulty about intercourse, especially in those who have recently married, but it is most important not to take it for granted that this takes place in the ordinary manner if a patient has been married a considerable time, because I have notes of a certain number of cases where there has been no proper intercourse for years after marriage. It is important to find out in the necessary questioning whether there is any sexual pleasure or desire, whether intercourse takes place at reasonable intervals or very seldom, and whether there is any reason to suspect that the husband is wanting in power or suffers from indifferent health. Notwithstanding the exceedingly delicate

nature of these inquiries, there is rarely difficulty in getting accurate answers which enable an opinion to be formed.

After eliciting anything which can throw light on the possible cause of sterility, a *thorough pelvic examination* may be made in the ordinary manner, noting the position of the uterus, whether it is movable, or whether there are any signs of previous pelvic inflammation; the condition of the cervix uteri, whether it is normal, conical, or unusually small, or if the os is closed or patulous, whether it seems natural to the touch or unhealthy. Any tumour of the uterus or swelling of the ovaries or tubes can be noted; also whether there are signs of inflammation of the mucous membrane of the vulva, vagina, or glands of Skene or Bartholin. It is especially of importance to make sure whether there is any vaginal discharge, and what its character may be. In certain cases it is copious and exceedingly irritating, as is evidenced by the condition of the mucous membrane. In such cases it may be assumed that if the discharge has such an intensely irritating effect on the mucous membrane it is certain to be inimical to conception. It is best to have it bacteriologically examined.

If it is found that there is a tough and unruptured hymen, it may be dealt with by either cutting it away or rupturing it. The latter is quite sufficient in any case where there is no vaginismus, and to make sure that there is no difficulty beyond the tough and unruptured hymen, glass dilators may be passed to secure thorough dilatation of the vagina. If the latter seems to be abnormally small, or if hyperæsthesia of the vulvar outlet is present, then glass dilators may be given to the patient with directions for passing them herself. One should be passed every day for a time, vaseline or some other lubricant being freely used, and before using the dilators it is best to apply a solution of cocaine (10 per cent. or 20 per cent.) if the hyperæsthesia is severe. Cocaine vaseline acts in the same way. If the hyperæsthesia is not severe, this will probably entirely cure the condition, the stretching of the vaginal walls apparently diminishing the sensitiveness, and doubtless helping to overcome the feeling of apprehension which exists in these cases, and which invariably makes the condition appear worse than it really is. But there are cases of really severe vaginismus which thorough dilation under an anæsthetic does not relieve, and when, in spite of cocaine vaseline applied freely before any attempt at intercourse, it is impossible to tolerate it. In these cases dilators are of no service, for the smallest cannot be borne, and in certain cases I have had under my care life has been a burden, the nervous system has become affected, extreme

irritability complained of, and in some cases regular neurasthenia developed. In these conditions the only treatment I know of as thoroughly efficient is the application of the Paquelin cautery. It may be lightly applied to the inner sides of the labia minora and all round the orifice of the vagina, and especially to the posterior fourchette. This must, of course, be done under an anæsthetic, and before doing so I ascertain the most sensitive points, for although in some cases the whole of the orifice of the vagina is implicated, and the slightest touch causes instant contraction, there are other cases where some points are specially sensitive, and these can be borne in mind in applying the cautery. In some of the cases of dyspareunia I have noted some minute fissures, and small follicular ulcerations about the fourchette and entrance to the vagina. These are exceedingly sensitive, and are often the cause of the vaginismus. The Paquelin cautery is the most rapid method of curing these.

There is another condition associated with dyspareunia met with in a few cases in women over thirty-five years of age who have married without knowing there was anything wrong—caruncle of the urethra, which is exquisitely painful. Removal with the Paquelin cautery, or cutting away and then applying the cautery, has entirely cured these in my hands. After the application of the Paquelin cautery to the mucous membrane or to the caruncle, I usually apply a 10 per cent. solution of cocaine on wool. This saves a great deal of pain on regaining consciousness. The parts touched must be treated as an ordinary burn until perfectly healed. There can be no doubt that the extreme sensitiveness is caused by the terminal ends of the nerves supplying the mucous membrane, and that when they are deadened by the cautery the sensitiveness disappears. It is most important that the cautery should be very lightly applied. It is quite unnecessary and harmful to burn deeply. Should there be a narrowing of the vagina, it may be dealt with at the same time by thorough dilatation.

Supposing it is found that the vagina is full of mucus, that the os is patulous and the lips roughened, with a history of prolonged vaginal discharge and excessive menstruation, then the best treatment is to curette thoroughly without any delay, for if the symptoms are severe and have lasted a long time, curetting is better and more efficacious than douching or any local treatment, which sometimes may be tried for many months without permanent good, as very often when the douching ceases the discharge returns. Any discharge ought to be carefully examined bacteriologically for gonococcus, staphylococcus or streptococcus; occasionally the bacillus coli is found, and if curetting is not advised cultures may

be made from the discharge, and a vaccine prepared accordingly. Up to the present I have not had sufficient evidence in its favour to warrant me in urging this method in all cases before curetting is undertaken. Nevertheless, I have known some cases where the treatment has been striking in results, and these may justify the enthusiasm evinced by some. Of course if it succeeds in curing the discharge, that is all we want, for it will save the operation of curetting, and the cessation of the discharge may lead to conception. If it does not succeed after two months' treatment, curetting can be always resorted to. I wish to lay great stress on vaginal discharges of any kind in cases of sterility, for I have had most striking results of conception following their cure. I have already said that, however slight, vaginal discharge may be toxic as regards spermatozoa, and, therefore, immediate treatment ought to be undertaken. Sometimes simple saline douching once or twice daily may be sufficient for its cure, and conception may follow.

If the amount of discharge is considerable or very unhealthy, and treatment does not relieve it while the patient objects to any operation, a course of waters and treatment at Franzensbad, Marienbad, Spa, Plombières, Ems, Schwalbach, St. Moritz, Gastein and other places abroad, or certain watering-places in this country, may be resorted to. In some cases the effect they have is remarkable, and there can be no doubt that they act in the first place on the mucous membrane of the vagina, curing discharge, and increasing circulation and nutrition of the uterus; and, secondly, by the life and surroundings on the general health. It is often of the greatest service to direct attention to the general health of the patient, and my belief is that when it is improved it has some important influence on ovulation. We know that some women conceive when they are in a most indifferent state of health, so that we cannot say that when the general health is lowered in tone there is little likelihood of conception. But it is a fact that often when nothing definite can be discovered in the pelvic organs to account for sterility, a sojourn abroad in some high mountainous region, with or without a course of waters, improves the health and conception follows. Sometimes it is a distinct advantage to let the wife go away alone. I have been struck with the fact that in certain cases where I have been able to discover nothing wrong with the pelvis, and where I have put down the sterility to profluvium seminis, a sojourn abroad has been followed by conception. This peculiar condition has sometimes appeared to me to come on when the woman is rather lowered in tone, for I have noticed that it has passed away on the improvement of the general

condition, although I am bound to say that this has not always been the case, and in certain patients the condition has persisted. In many cases there is a certain amount of neurasthenia, and a prolonged course of phosphates or glycono-phosphates is of great value.

Before passing from medical treatment I must refer to *organo-therapy*, which occasionally seems to be of great benefit. I frequently order ovarian extract if the sterility seems to be associated with irregular menstruation or amenorrhœa. Hans Bab proposes to supplement this treatment with yohimbine hydrochloride, which has been thoroughly tested, and is without danger when given in proper doses. He states that in the promotion of hyperæmia no physical measure can compare with this preparation. The action of this combination in the treatment of sterility, he considers, can be supplemented still in a further direction by the addition of lecithin. This is a highly important constituent in the organism, apart from the brain and nerves, and is found in abundance in the blood corpuscles, the semen, the vitellum, the placenta, the foetal cells and the milk.

Before dealing surgically with cases of sterility it is well to have a general rule to be guided by as to time in those recently married, and the question must be asked "*When may a marriage be described as sterile?*" Torkel and various authors consider that the answer is from one to five years, according as it is congenital or acquired. After the fortieth year, only one in forty of all women become pregnant.

Even with a pinhole os it is not necessary to hurry about operation. I usually allow at least eighteen months to pass before thinking of *operation*, unless there is some special reason against this course. But supposing a reasonable time has elapsed since marriage, and there has been no suspicion of conception, ~~then~~ operation by thoroughly dilating the cervix may be contemplated in the presence of a pinhole os, a small conical cervix, or ~~a~~ any condition of the cervix which leads one to think that it may be ~~the~~ cause of difficulty in the entrance of the spermatozoa. I have already said that I do not believe that any amount of contraction will prevent the entrance of spermatozoa; nevertheless, it is a fact that frequently after thorough dilatation of the cervix conception immediately occurs. There need be no hesitation about operating if dysmenorrhœa is present, for the dilatation of the cervix will probably cure the pain, even if not followed by conception. Thorough dilatation of the cervix is usually most effective.

As long ago as 1826 Dr. John Mackintosh, lecturing on the

practice of physic in Edinburgh, advocated dilatation, and subsequently published cases showing that barren women conceived after this operation.

Professor Pozzi describes an operation, *commissural evident*, which consists of bi-lateral discission of cervix in lengths of 2 and 3 centimètres, dilatation of cervical canal, curettage, and stomatoplasty, which has for its object the uniting of the internal cervical with the external cervical mucous membrane. This is certainly a more elegant operation than that of Sims, who allowed these cut edges to heal freely. Professor Pozzi says that in more than 25 per cent. of his cases pregnancy followed the operation, and that in some cases the patients had been married from five to sixteen years, impregnation following the operation in a few months.

My belief is that with reference to surgical treatment soon after marriage for the purpose of impregnation, thorough dilatation of the cervix by graduated dilators is sufficient, but, of course, the patency does not remain long, and doubtless any such operation as that of Pozzi will secure that patency for a more lengthened period. It must be remembered that any operation of this kind must be undertaken with the strictest aseptic and antiseptic precautions, for all operations about the cervix without proper attention to these details may be followed by metritis or parametritis. In days bygone, when these operations were performed with no precautions whatever, catastrophies were frequent. It is of great importance, in performing this operation, that the dilators should be slowly introduced, enough time being allowed for each dilator to do its work before another is inserted. This prevents the splitting of the mucous membrane of the cervical canal, which, when it occurs, if thorough antiseptic and aseptic precautions are not taken, may lead to danger.

I have already discussed curetting (*see under Dysmenorrhœa*), but I would here give a word of caution against repeating the operation unnecessarily. It undoubtedly removes the delicate mucous membrane from the cervix, and if repeated curettings take place, the epithelium will not grow again, or grows imperfectly. After curetting, the endometrium is reproduced in about two months. If acted on by strong acids and other escharotics, resulting in sloughing, the endometrium is but imperfectly re-formed, even after several months.

Thorough dilatation secures free drainage from the uterine cavity, so that, should the endometrium be affected, all discharge can more easily escape,

In certain cases of operation for chronic salpingitis, where one or both tubes are to be removed, the method now adopted by some is to remove the distal part of the tube, then split open longitudinally the remaining stump and secure its patency by securing the peritoneum to the mucous membrane of the tube. The diseased part of the ovary is dissected away, and the remaining healthy parts secured together and anchored as near as possible to the stump of the tube. Unless future pregnancy is quite out of the question, it is important to preserve as much as possible of the fimbriated extremity of the Fallopian tube when it is found to be partially diseased. Severe infection of the tube generally destroys the fimbriated extremity, but infection in a lesser degree may only cause a small portion of the ampulla to be involved, and none of the fimbriae. Under these circumstances it is advisable to remove only the affected part, and to unite the fimbriated extremity to the portion of the tube which is left behind. In the case of ectopic gestation the opposite tube may be closed by lymph resulting from inflammatory disturbance which affects both sides, so that the woman may be sterile unless something is done at the time of operation. If the whole tube can be saved and the products of conception removed, this may be considered with a view to future pregnancies. But it is right to point out that pregnancy can occur through the opposite tube, and some consider that it is wiser to remove a tube which has already undergone certain destructive changes. It must be remembered that the epithelium is certain to be destroyed, and that there is therefore a risk, if the tube is left, of another ectopic gestation occurring. At any rate, the whole of the affected portion of the tube should be removed at the operation, and the end of the tube, if healthy, left, taking care to render it patent by suturing the inner and outer coats.

Cases of persistent retroflexion of the body of the uterus, giving rise to local symptoms, may be treated in the ordinary manner, but surgical interference ought not to be recommended with the view of curing sterility unless those symptoms are urgent. There are certain cases of retroflexion which are associated with conception where the ovum is invariably lost, and where the patient does not go to the term until the flexion is cured. If this cannot be done in the ordinary manner, the question of surgical interference may be entertained by externally shortening the round ligaments, or by the intra-abdominal shortening of the round and broad ligaments described by Dr. Douglas Bissell in 1891, or any other method preferred by the operator, except abdominal fixation in the young.

In some cases a healthy portion of a diseased ovary may be transplanted into the body of the uterus near the split oviduct. The object of this is that ovulation will occur in the immediate vicinity of the cilia of the tube. But if the ovary is completely surrounded by the uterine tissue, the matured ova cannot escape, and fecundation is therefore impossible. Lately, transplantation of the ovarian substance from one patient to another has been successfully accomplished by Dr. Robert Morris.

In cases in which peritonitis has been set up, and the ovaries covered with adhesions, it may be sufficient to thoroughly set these free for conception to follow.

Before leaving the surgical treatment of sterility I must mention the important bearing of a severely lacerated cervix in this condition, and the necessity of perfect repair. In these cases there is usually a considerable amount of discharge, because the lining membrane of the cervix is exposed to the noxious influences of the vaginal keeping up a chronic catarrhal condition which continued local treatment will not cure, the discharge having a toxic influence on the spermatozoa. Even if pregnancy does take place, abortion occurs early on account of the loss of the sphincter action of the cervix. By the careful repair of the laceration combined with curetting, the catarrhal condition is cured and conception occurs.

Some advocate the use of *electricity* in the treatment of sterility. I have had no experience in its use with reference to this, but some years ago I used it in hospital practice, when Apostoli brought forward the treatment of fibroid tumours by electricity. Undoubtedly it cures endometritis and endocervicitis, but after careful trial, I gave it up, considering that the time spent over its application was too great, when a curetting could cure the patient rapidly. Professor Pinard considers that static electricity frequently gives good results, and may be recommended.

In conclusion, I would say that undoubtedly at the present time sterility in women is not looked upon as the hopeless affliction in the light in which it used to be regarded. This is so because the etiology in many cases is better understood, and therefore directs us as to the treatment. If we feel that there is no apparent reason why the wife should not conceive, and if we have placed her, by removing pathological conditions, in the best and healthiest condition for conception, without result, then we must turn our attention to the husband and hand him over to the bacteriologist or genito-urinary specialist. There can be no doubt about the gonococcus being responsible for much, but it is useless to endeavour to make it responsible for nearly all. Fortunately, it can be

combated now in a manner never dreamt of in former days by vaccine therapy, and pathological conditions removed by this modern treatment. In like manner it is right to draw attention to the fact that certain continuous vaginal discharges, apart from that caused by the gonococcus, which cannot be cured by douching, may yield to vaccine treatment if the organism causing that discharge is isolated, cultivated, and a vaccine made therefrom. The modern internal treatment by organo-therapy requires most careful consideration, and much more experience of it is needed before statistics of real value can be tabulated. In my own experience I have had such success in the treatment of sterility by curing ordinary vaginal discharges, that I have been most seriously impressed by the fact that apparently simple discharge may contain much toxic material to act on the protoplasm of the spermatozoa. If any discharge exists, it must be cured, and if it does not yield to ordinary treatment, through curetting may be advised, or if this will not be entertained, then a course of waters at one of the places already mentioned may be of the greatest service.

There are certain cases of women who conceive repeatedly, but who can never bring forth full-term children. They either miscarry early, or bear premature still-born infants. Space will not permit me to go fully into the treatment of this class of sterility, but it is of the utmost importance to try to find out the cause. If a patient complains of frequent miscarriages, syphilis should be suspected. Whether, on investigation, there is reason to believe it to be the cause of the constant miscarriages or not, it is remarkable how frequently those patients do well if placed on anti-syphilitic treatment. I have for many years given the following prescription to patients who have miscarried repeatedly and early, or who have continued the pregnancy until late, and have been delivered of premature still-born children: Quin. Sulph., gr. 2; Hyd. Perchlor., gr. $\frac{1}{2}$; Misce. pil. [U.S.P. R. Quin. Sulph., gr. 2; Hydrarg. Chlor. Corros. gr. $\frac{1}{32}$]: one three times a day after meals.

This I have commenced as soon as the patient is pregnant and have continued it up to term. I have ordered this pill whether I have suspected syphilis or not, and the results have been most satisfactory. Whether the cause of the abortion is in the ovum itself or whether there is a nidus in unhealthy uterine mucous membrane, this alterative pill seems to be of great service. If the quinine should cause headache, it may be omitted, and the perchloride of mercury continued, with some extract of gentian. In certain cases chlorate of potash may be ordered, in addition to the foregoing, and may be continued for months. The administration of the mercury

must be watched, and the patient warned to discontinue it, should any signs of mercurialism develop. I usually advise the pill to be discontinued for a couple of days at the end of each fortnight. Some prefer a long course of *viburnum prunifolium* as a uterine sedative, or iodide of potassium and iron.

In certain women who habitually miscarry, there can be no doubt that the avoidance of all chance of conception for many months by a sea voyage, or other means of separation, which leads to an improvement in health, will often result in the sterility being cured.

There are certain cases in which sterility depends upon premature death of the fetus, this sometimes occurring at the seventh or eighth month, or later. Such patients must be carefully watched, and if there are signs of increasing feebleness of the fetal heart sounds, premature labour may be induced. I have reason to believe that I have saved infants in this manner after successive dead children have been born. Each case must be most carefully investigated in order to ascertain, if possible, the cause of the conditions which lead to the sterility, for this will give us the means of treatment most likely to be successful.

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VAGINISMUS.

VAGINISMUS is a neurosis, and may prove to be one of the most terrible afflictions of a young married woman. To Marion Sims belongs the credit of first describing it and of naming it. He took the name as indicating an acute spasmodic affection of the muscles around the entrance of the vagina, in the same way that laryngismus indicates a spasm of the muscles of the larynx. It is important to clearly understand what the affection consists in, for it must not be confounded with ordinary dyspareunia, although, of course, it is one of the causes of dyspareunia. Marion Sims gives an excellent description of it. "By the term vaginismus I mean an excessive hyperæsthesia of the hymen and vulvar outlet, associated with such involuntary spasmodic contractions of the sphincter vaginæ as to prevent coition. This irritable spasmodic action is produced by the gentlest touch; often the touch of a camel's-hair brush will produce such agony as to cause the patient to shriek, complaining at the same time that the pain is that of thrusting a knife into the sensitive part. In a very large majority of cases the pain and spasm conjoined are so great as to preclude the possibility of sexual intercourse. In some instances it will be borne occasionally, notwithstanding the intolerable suffering, while in others it is wholly abandoned, even after the act has been repeatedly, as it were, perfectly performed."

The mucous membrane is so sensitive that the least touch causes contraction of the sphincter vaginæ, the levator ani, the transversus perinæi and the adductors of the thighs. This spasm may be produced by an attempt at intercourse, or in endeavouring to make a vaginal examination; occasionally the spasm involves the rectum. It will usually be found that the most exquisitely sensitive areas are the posterior fourchette, the hymen, and about the urethra. It is possible that some lesion in the sensitive filaments of the internal pudic nerves, distributed to the vulva, vagina and anus, is the cause of the reflex spasm and pain, but up to the present moment we know of nothing definite as a pathological cause.

The disease is almost invariably found in women of a neurotic type and in those belonging to the better classes. It is occasionally found amongst hospital patients, but very rarely so.

It is discovered at once after marriage, which is, as a rule, not

consummated, and this proves that there are degrees of the affection. In some cases the hymen may be perforated at once, although it has been impossible to permit sexual intercourse to take place a second time, and the unsuccessful attempts have led to the wife seeking advice. In other cases there can be no doubt that vaginismus has been induced by unsuccessful attempts on the part of the husband, owing to want of virility; whether this is due to nervousness or more serious disturbance, the effect is the same. Such a feeling of apprehension is induced at each unsuccessful attempt at intercourse that pain and spasm are brought on, and vaginismus developed. The result is much mental misery, sterility, and frequently conjugal unhappiness. As a rule when vaginismus is present, there is absence of sexual desire, so that any attempt at intercourse comes to be regarded with fear and often loathing. Yet it must be remembered that this is not always the case, for I have known more than one patient who has told me that there has been strong sexual desire, although it has been impossible to gratify it.

Vaginismus is frequently associated with dysmenorrhœa, and sometimes the operation of dilatation of the cervix, combined with any necessary treatment for the vagina, is followed by cure of the menstrual pain and development of sexual desire, as well as complete cure of the vaginismus. As a rule, sterility is associated with vaginismus, but this is not invariably the case, for we know that the spermatozoa can easily travel, and even with an unruptured hymen they may gain access to the uterus. In these cases, however, even after pregnancy at the full time, the patient is not cured.

Unfortunately, vaginismus does not tend to become cured without treatment. But Matthews Duncan said that it is liable to spontaneous "variations" and that it may disappear. In certain cases which are not of the most severe type I have known intercourse to become gradually more tolerable, although always painful, when no operation or treatment beyond lubricants has been adopted.

Herman mentions that he has seen two cases in which vaginismus developed gradually in patients who had been married for years without either impediment or pain in intercourse, and in whom no local cause could be found to account for it. In one of the cases no cause could be discovered; in the other, mental shock produced stoppage of menstruation, intercourse became painful, and the passage seemed blocked.

Kelly considers that there is a urethral form of the disease, probably of gonococcal origin, in which the meatus urinarius is swollen, red, everted and exquisitely tender. The pain on contact

is equal in severity to that of a urethral caruncle. In this case the vaginal orifice and all the surrounding parts can be freely touched, but any contact with the urethra produces intense pain. This form, however, is secondary to infection, and is not the pure vaginismus, which is a true neurosis.

There is a cause of vaginismus sometimes met with, in the displacement of the fourchette of the vagina and orifice upwards and forwards, in consequence of too great obliquity of the pelvis, so that the passage becomes more difficult of access, rendering the clitoris and urethra liable to injury.

There is not likely to be any difficulty in the diagnosis of these cases. Before thoroughly examining a case it may appear to be from the history one of vaginismus, and may prove to be one of a small vagina in a nervous woman. Merely gently touching the mucous membrane anywhere will prove its nature, for no pain or contraction will be produced. There ought to be no difficulty in distinguishing it from cases of dyspareunia caused by tender spots, diseases grouped by Matthews Duncan under the term "secondary vaginismus." Careful inspection will prove the nature of the case.

Palliative Treatment. — In this form of treatment it is a prudent course to insure *complete rest* for a time for the wife, for very often the health is affected considerably before medical advice is sought, and special attention should be directed to the nervous system. To this end sound and refreshing sleep must be induced, and no opportunity allowed of disturbed nights. This may be obtained by bromide of ammonium or strontium, or any other simple remedy soothing to the nervous system. When sufficient rest has been obtained, then palliative remedies may be tried. The best is to use *glass dilators*, and to apply a solution of cocaine (10 per cent.) on wool to the orifice of the vagina for at least ten minutes before any attempt is made to introduce a dilator. After the wool is removed vaseline may be freely applied, and then the smallest dilator introduced. Sims's "vaginismus rest" may be used, and allowed to remain in only a few minutes at first and a little more each day, and a larger size may be tried as soon as the patient can bear it, the dilator being worn for an hour or two each day. The dilatation renders the mucous membrane less sensitive and the patient less apprehensive. This may be continued until it is thought safe to allow a further attempt at intercourse, and it must be remembered that it is only prudent to delay until one is reasonably sure of success, for failure is disheartening to the patient and injurious for her nervous system.

Operative Treatment.—It is right to point out that it is only in the milder cases of vaginismus that this treatment can be carried out; in the severe cases it is useless to attempt it, and waste of time. In the latter, it is much more satisfactory to carefully examine under an anæsthetic. Before doing so, it is well to ascertain, if possible, if there are any specially sensitive parts, and to make sure of the marital relations. To this end the husband can be questioned, if possible, as to his health and sexual power. It is of great consequence to know if the vaginismus was present immediately after marriage, or if it developed subsequently. It saves time, if permission is obtained to do what is considered to be necessary at the time of examination, so that everything can be prepared accordingly. After cutting away the hymen, Sims recommended that two fingers should be passed into the vagina to stretch the outlet, and then to make a deep cut in each sulcus about 2 inches long, united at the raphe, and prolonged in the form of a V quite down to the perineal integument. Each cut is about $\frac{1}{2}$ inch or more above the sphincter vaginæ, $\frac{1}{2}$ inch over its fibres, and 1 inch from its lower edge to the perineal raphe. This is to be followed by the insertion of bougies, so as to stretch the opening 3 inches long, and $1\frac{1}{2}$ inch in diameter.

In my own practice I never make this incision. In the first place, after thorough dilatation with the fingers and dilators, I remove the hymen thoroughly with scissors or knife, and then lightly apply the small knife of the Paquelin's cautery to the cut surfaces, which stops the bleeding. Afterwards the cautery is lightly applied to all the mucous membrane of the outlet, to the neighbourhood of the urethra, and to the posterior fourchette, where it is applied more deeply in the middle line. If there are patches which have been proved to be hyperæsthetic in the examination before the anæsthetic, they can receive special attention from the cautery. It is most important to make sure that the posterior fourchette is thoroughly divided with the Paquelin knife, just as if it were being done by the ordinary knife. After this is over, a pledget of sterilised wool soaked in a 10 per cent. solution of cocaine is applied. This saves a good deal of pain on regaining consciousness from the anæsthetic. The subsequent treatment is that of a superficial burn. During the time this is healing the patient has complete rest in bed, and this alone is often of great service. When the parts are thoroughly healed the glass dilators can be gradually employed in increasing sizes, and worn for one or two hours daily. It is much more satisfactory to commence this treatment immediately after the parts treated have healed than to

allow any attempt at intercourse. The patient need not be considered to be in the hands of a doctor when the operation is finished with, for she can use the dilators regularly herself.

I have now operated upon many of these cases, and have found the above method of treatment more satisfactory than any other I have tried, for it is eminently successful.

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HERMAPHRODITISM AND PSEUDO-HERMAPHRODITISM.

Hermaphroditism, which implies the possession by one individual of both an ovary and a testis, is so exceedingly rare, if it ever occurs, that no further discussion of it is necessary here.

Pseudo-hermaphroditism is the condition in which the subject possesses either ovaries or testes, while the formation of the external genitals, as well sometimes as that of the internal organs, is abnormal and frequently misleading in regard to sex identification.

This state of affairs is not uncommon, so that a correct diagnosis is of some moment with regard to the advice which should be given as to whether the child should be brought up as a male or female.

There are three important classes of pseudo-hermaphrodites.

(1) Internal male or female pseudo-hermaphrodites possess testes or ovaries and external genitals corresponding to the sex characteristics of the genital gland. In the case of a male, however, there may be a uterus, Fallopian tubes and even a vagina. In the female there may be the remains of persistent Wolffian ducts.

(2) External pseudo-hermaphrodites possess external genitals of the opposite sex character to the genital glands.

(3) Complete pseudo-hermaphrodites. In these we find that the genital gland is the only indication of sex. In the male the Müllerian derivatives persist and the external genitals are of the female type. The female complete pseudo-hermaphrodite possesses the derivatives of the Wolffian duct, external genitals of a male type, together with ovaries.

It must be remembered that while the *uterus masculinus*, which is developed in some male pseudo-hermaphrodites, as indicated above, is often imperfect, in some it is well developed, and it is said that "menstruation" may occur from it. If this is so, it adds considerably to the difficulty of diagnosis. It must be borne in mind that all the cases reported have not been very carefully studied, and possibly the subjects who menstruated have been female external pseudo-hermaphrodites.

The treatment and management of these cases involves some difficulty and responsibility, and will best be considered in regard to the age and previous upbringing of the individual under consideration.

A large proportion of cases that come under observation are merely males with hypospadias, undescended testes, and a divided scrotum. As far as we are concerned here we have only to advise that these individuals are males, and that in many cases plastic operative procedures can be carried out to remedy the condition to a great extent.

There are, however, some cases in which the external genitals so completely resemble those of the opposite sex to that of the genital gland (complete pseudo-hermaphroditism), that it is practically impossible to express a certain opinion on naked-eye evidence. We can, of course, usually recognise that the case is one of pseudo-hermaphroditism, but we cannot be sure of the sex unless a histological examination of the sex gland is made.

It is hardly necessary to say that in these cases all specimens, such as undescended testes, removed should be subjected to an histological examination by a competent microscopist, evidence of sex thus obtained being, of course, of incalculable value.

When the child is young and the question is being considered as to whether the individual is a boy or a girl, a careful physical examination may enable us to decide; but if there be the slightest doubt, the child should be brought up as a boy, for although it has been shown by Neugebauer¹ that the proportion of male to female pseudo-hermaphrodites is not so large as usually stated, being in fact about 70 per cent. of all cases, yet the future possibilities are much less likely to be complicated if the child is brought up as a boy. Occasionally it is necessary to decide the sex of an adult individual who has been brought up as a boy or a girl, according to the belief of the parents or nurse, or the casual opinion of the medical attendant at the birth. It is useless to expect any help from the patient's own statements of his feelings. Pseudo-hermaphrodites are frequently devoid of sex instincts, and have married one of their own sex in many instances. Nor, in the present state of our knowledge, can menstruation be said to be a positive indication of the sex. In these circumstances the proper course to follow is to advise that the individual who has been brought up as a male shall continue to be considered one, whether the true sex be male or female. If, however, the subject is a male brought up as a woman, the question becomes a little more complicated. In such circumstances the situation should be put to the individual; he must either change his mode of living and assume male attire, or he may prefer to have the undescended testes removed and continue to pose as a woman.

The whole subject is fraught with grave possibilities and dangers,

and many tragedies have resulted from mistakes and false marriages. In some cases the individual has changed name, sex and abode, and has started life afresh. More often the secret has been hidden. One thing, however, stands out very clearly: if there is any reasonable doubt as to the sex, the child should be brought up as a boy. In this way mistakes in regard to marriage are less likely to occur, for a male will usually, if not always, find out his sexual limitations before taking such a serious step.

W. BLAIR BELL.

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DISEASES AND AFFECTIONS OF THE FEMALE URETHRA AND BLADDER.

DISEASES OF THE URETHRA.

Displacements of the Urethra.—The urethra may be (1) displaced downwards, (2) drawn upwards, or rarely (3) displaced to one or other side by growths in its neighbourhood.

The displacement downwards is an accompaniment of prolapse of the anterior vaginal wall, which carries with it the base of the bladder and the urethra. This is a common cause of frequency of micturition, which may be the only symptom complained of. Occasionally, owing to the curvature of the urethra, the patient may be unable to pass her water until the prolapse has been pushed up with the finger. Incomplete emptying of the bladder may accompany this condition, and cystitis is liable to result.

The treatment is that of prolapse of the uterus and vaginal walls, and consists in re-position of the displaced organs, which are kept in place by means of pessaries.

I have found on a few occasions in patients of the hospital class, who have allowed the prolapse to exist unreduced for long periods, that when the protrusion was replaced and kept up by a pessary, the urethra appeared to have lost its contractile power, and incontinence of urine resulted.

It is difficult to say how soon the urethra regains its normal tone, for such patients remove the pessary at once, preferring the discomforts of the prolapse to that of being constantly wet.

The dragging upwards of the urethra with the bladder, in connection with tumours of the uterus, the retroverted gravid uterus and in labour, need only be mentioned here.

In these cases a difficulty is sometimes experienced in emptying a distended bladder, more particularly when associated with retroversion of the gravid uterus or in the course of labour. A metal catheter should be avoided on account of the risks of perforating the urethral wall, and a glass one is also contra-indicated on account of its rigidity and the risk, further, of its breaking. A rubber catheter is the safest one to use under these circumstances.

Prolapse of the Urethral Mucous Membrane.—This occurs chiefly in children. The mucous membrane which protrudes from the urethral orifice is reducible or not according to the length of time it has existed. When of some duration it becomes œdematous, bluish in colour and irreducible.

If it can be reduced, the swelling should be pushed back and kept up by a pad and a T-bandage. At the same time any conditions existing which cause straining efforts, and which may have been responsible in the first instance for the protrusion, such as cough or constipation, should be dealt with.

If in spite of treatment the prolapse constantly recurs, or if it cannot be reduced, the protruded mucous membrane should be removed. Cauterisation has been employed for the purpose, but owing to the swelling and sloughing it sets up it is not to be recommended.

The simplest and best plan is to cut off the protrusion with scissors, bringing the cut edges of the mucous membrane together with fine catgut sutures. Care should be taken that the upper cut edge of the mucous membrane does not slip into the urethra out of reach. To obviate this difficulty the sutures may be applied as successive portions of the prolapse are divided, or they may be passed through the base of the protrusion before it is cut away. This is facilitated by cutting down to the base of the swelling on each side, thus forming two lips which can be dealt with separately. The patient may be allowed to pass her water when she requires to do so. As in operations on caruncles a catheter is not needed generally. When retention does occur, a glass or rubber catheter should be carefully introduced.

Dilatation of the Urethra.—Under this heading are included those cases in which a patient suffers to a greater or less extent from involuntary escape of urine.

Complete incontinence is rarely met with, and is then due usually to over-distension of the urethra from digital examination of the bladder or extraction of a calculus.

Slight degrees of weakness are not infrequent, the patient suffering from an involuntary escape of urine during sudden exertion or whilst sneezing or coughing. This occurs most often as the result of parturition, and is common in multiparæ during the early days of the puerperium. The trouble generally clears up, but may persist. Whatever the explanation, and many have been suggested, the result is a weakness of the circular fibres of the urethra. I have mentioned this condition above as being found in a few cases of long-standing prolapse. The circular fibres appear to have lost

their contractile power from disuse, the urine being retained by the flexion of the urethra.

In cases in which the incontinence is of recent origin, as after parturition or forcible dilatation of the urethra, the patient should be kept at rest so long as there is a prospect of improvement. Hot vaginal douches and *nux vomica* internally will help to restore tone to the muscle. Galvanism might also be tried before resorting to operation. In the rare cases that persist, some operative procedure may be called for.

Of the numerous operations suggested and carried out, the one adopted by Frank appears to be the most rational.

The operation is quoted by Dr. Kelly as follows: "Frank's procedure is to lay a small catheter in the urethra, and then to excise a wedge-shaped piece from the posterior urethral wall, including the vaginal as well as the urethral mucosa, and extending from the external urethral orifice to within 1 centimètre of the internal orifice. The incision is now continued in an elliptical form on the vaginal wall beyond the neck of the bladder. By a transverse row of interrupted sutures the whole wound surface is now accurately approximated." The elliptical excision is "to form a sort of buttress behind the neck of the bladder."

Engström did not include the urethral mucosa in a case successfully treated by him, and this modification is worth consideration.¹

Peri-urethral Abscess: Saccus of the Urethra.—Under this heading we meet with two conditions: an abscess in the peri-urethral tissues not communicating, at all events in the first instance, with the urethra, and a dilatation of a crypt of the urethra with suppuration of the contents. The latter form often gives a history of painful and frequent micturition for some years, with a sense of discomfort and bearing-down. The contents can often be squeezed into the urethra. I have seen a case in which a calculus formed in the sac.

The same treatment may be adopted first of all for both varieties. A free incision should be made through the vaginal wall into the cavity, whether this communicates with the urethra or not, and the sac is then packed with iodoform gauze. An abscess cavity, even when it has opened into the urethra before operation, will quickly granulate up and close.

On the other hand, a dilated crypt, which is lined with a layer of epithelium, will very probably contract down, leaving a urethro-vaginal fistula. This will necessitate a second operation for removal of the epithelial lining. This should be carefully dissected away and the cavity closed by salmon-gut sutures passed deeply so as to

include the whole depth of the wound. This plan is better than the use of buried sutures in the urethra and deep part of the wound, as they are liable in this situation to interfere with healing.

In the case of a dilated crypt it is sometimes recommended that the wall should be removed at once after incision and evacuation of the contents. This no doubt would be good practice if inflammation of the wall and suppuration of the contents had not occurred. In most cases, however, that I have seen, suppuration had already occurred, and I believe this is the common condition found. It is safer, under these circumstances, to drain for a while, removing the lining membrane later.

Stricture of the Urethra.—Such a diminution of the calibre of the urethral canal as to interfere with the passage of urine is very rare. As in the male, it is due in most cases to gonorrhoea. It has also been described as the result of sloughing after difficult labour, and the cicatrization of a chancre. In old women a narrowing of the canal associated with induration of the peri-urethral tissue has been described as senile stricture. Difficulty in the passage of water may be due to blocking of the canal by malignant growths.

Dr. Herman² has described a case in which *esthiomène* led to the closure of the meatus urinarius and dilatation of the urethra. He has measured the female urethra, and finds that in most cases it will admit a No. 17 male catheter, and in nearly all cases a No. 14. He considers that a female urethra which will not admit a No. 10 catheter is the subject of stricture.

A stricture of the urethra should be treated by dilatation, either gradual or at one sitting. Dr. Herman prefers the latter, dilating the urethra up to No. 16 or 18.

The patient should be anæsthetised and placed in the lithotomy position. Careful asepsis should be observed to prevent infection of the urethra and bladder. Either Hegar's dilators or Kelly's urethral dilators may be used, or failing these male bougies and catheters. With the small-sized instruments care must be taken not to perforate the wall of the urethra.

Gradual dilatation is effected by the daily passage of bougies. It is not necessary or advisable to use force, larger ones being introduced gradually as the stricture yields. After it is fully dilated, the patient should be kept under observation for some time, a bougie being passed occasionally to guard against relapse.

If surrounding induration exists, as in senile stricture, and there is much resistance to dilatation, probably the best plan to adopt would be to tie in a catheter, replacing it day by day with one of a larger size.

In the case of malignant growths involving the urethra, a catheter may be passed for a time. Much suffering may result, however, from its persistent use in these cases. As soon as the passage of a catheter causes much pain, it is better to establish a permanent opening from the bladder into the vagina. This is done by cutting down in the middle line of the anterior vaginal wall upon a catheter or sound in the bladder. As a fistulous communication is certain to result sooner or later, by this procedure one is only anticipating the natural course of events.

Urethral Caruncle.—Urethral caruncles usually grow from the posterior border of the meatus urinarius, are most frequent in women over the age of forty, and are a common cause of painful micturition.

For their removal local anæsthesia is generally sufficient, a general anæsthetic being reserved for patients who are very nervous. The operation can be performed with the patient in the lithotomy position or on her side, the former being the more convenient. The parts are rendered insensitive with 20 per cent. cocaine. Having been well cleansed with 1 in 1,000 perchloride lotion, the caruncle is laid hold of and pulled gently forward. If very soft and friable it may, unless care is taken, be pulled right away. The mucous membrane at the base of the caruncle is cut through with scissors. Then with a cautery, which has been allowed to cool to a red heat, touch the raw surface. This arrests hæmorrhage and destroys any vascular tissue left behind. When the caruncle has been removed cleanly, the cautery is not a necessity. There may be very little bleeding, in which case the pressure of a pad will suffice to control it, or the edges of the uncauterised wound may be brought together with one or two fine catgut sutures. It will be found easier to pass these through the mucous membrane before cutting off the caruncle and to tie them after its removal.

A pad is applied to the wound with a T-bandage, and the patient is kept in bed for a few days.

Urethral Hæmorrhoids.—Swellings similar to those found at the anus and due to varicosity of veins may be found at the urethral meatus. They are easily distinguishable from caruncles by their colour and the lack of sensitiveness. They do not give rise to trouble unless they become thrombosed, when they may cause a swelling as large as a cherry and become pedunculated. They should be removed in the same way as a caruncle, the swelling being cut off and the wound sutured with fine catgut.

Fibroma, Sarcoma and Carcinoma of the Urethra.—Apart from caruncle, growths of the urethra are rare and do not call for

extended notice. A few cases of *pedunculated fibromata* attached to the margin of the urethra, chiefly in infants and young girls, have been described. They would be removed by division of the pedicle, the edges of the wound being sutured with catgut.

I think that some of the fibrous tumours described as vaginal in origin may be derived from the urethra. I have operated on two tumours of this nature which were 2 to 4 inches in their chief diameters, and which projected from the vulva in close relationship to the urethra. They were readily shelled out, except where they were in contact with the urethra, which was in close apposition to and stretched over the tumours. One was attached to the urethra on its anterior aspect, the other behind. A little care was required in the separation of the urethra to avoid opening the canal. This was effected with the aid of a sound in the urethra. The wounds were closed with deep salmon-gut sutures carried through the base of the cavity so as to obliterate it.

Primary Carcinoma of the urethra is very rare. The urethra is generally involved by extension of growth from neighbouring parts. It is seldom that any operation beyond incision of the bladder through the vagina for the relief of painful and difficult micturition is possible. In cases seen early removal of part or the whole of the urethra with perhaps part of the bladder may be practised.

One cannot lay down definite rules as to the operation. When the growth is operable, which is determined by its extent and freedom from attachments to the bone beneath, incisions are made all round wide of the tumour, as much urethra as is necessary being removed. There will be considerable bleeding from the cut surfaces. This will be readily controlled by salmon-gut sutures passed deeply to the bottom of the wound, so as to approximate the cut surfaces and obliterate the cavity. It is better not to spend time in an attempt to control the bleeding with forceps and ligatures.

If possible, the edges of the cut urethra should be sewn to the cut mucous membrane of the vagina. If the internal sphincter of the urethra is left intact, the patient may retain control of her water. Cases in which complete control has resulted have been described by Dr. T. G. Thomas³ and by Dr. McMurtry.⁴

Sarcomata of the urethra are very rare. I have seen one case of melanotic sarcoma which recurred after removal.

Tender Red Patches in the Urethra.—Dr. Herman describes under this heading a condition which causes painful micturition. He describes the mucous lining as being "either wholly or in patches of a vivid red, like a urethral caruncle or of a deep purple."

The pathology of the condition is uncertain. Dr. Herman thinks

that it is allied to the painful red patches found on the vulva. It is possible that in some cases it is due to chronic urethritis, and Dr. W. H. Baker regarded it as such.

I have found Dr. Herman's treatment successful. He recommends putting in the urethra once in two or three days a bougie containing 2 gr. of iodoform or 6 gr. of dermatol. I have also found benefit by the application of silver nitrate.

G. BELLINGHAM SMITH.

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- ² "Trans. Obst. Soc.," Lond., 1886, XXVIII., p. 267.
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- ⁴ "Ann. Surgery," Lond. and New York 1908, XLVII., p. 1032.

DISEASES OF THE BLADDER.

DISPLACEMENTS.

As a normal condition the bladder is drawn up in the course of labour. It may be drawn up by tumours, and of these, fibro-myomata of the uterus are the most frequent causes of displacement. This is a fact to remember in operations for the removal of fibro-myomata.

The commonest displacement is downwards, and is due to weakness of the pelvic floor. It is associated with some descent of the uterus. The displacement may be small and yet give rise to a sensation of bearing-down, relieved at once by lying down and to frequency of micturition.

If an examination shows some degree of descent of the anterior vaginal wall and bladder, and the symptoms are continuous, the support afforded by a pessary is indicated, or the repair of a relaxed vulval outlet. The details of treatment belong to the subject of Uterine Prolapse (*see* p. 688).

In long-standing cases the condition is aggravated by imperfect emptying of the bladder and consequent stagnation of urine.

A very rare condition is eversion of the bladder through the dilated urethra. This is found, as a rule, in children and old people.

The patient should be placed in the knee-chest position and the protruded bladder gently replaced. If the urethra does not contract down, it will require the treatment described under the heading of Dilatation of the Urethra (*see* p. 868).

FOREIGN BODIES IN THE BLADDER.

These consist of :

- (1) Calculi, the most common body found in the bladder.
- (2) Foreign bodies introduced through the urethra, such as a catheter or part of one broken off, hairpins, etc.
- (3) Foreign bodies which have ulcerated through the bladder wall, such as a ligature following an operation, bone from an extra-uterine gestation, or a pessary from the vagina.

In my experience the pessary that most often ulcerates through is Zwancke's pessary, though it would never escape entirely into the bladder. This accident appears to be much less common of late years, owing perhaps to the less frequent use of this instru-

ment, operation largely taking its place, and to greater care in its employment.

There is more choice in the removal of foreign bodies from the female bladder, owing to its anatomical arrangements, than in the male. The short urethra allows of small bodies being withdrawn through it, whilst those of larger size may be removed through an incision in the vesico-vaginal septum. A third route, as in the male, is by supra-pubic incision.

Foreign bodies, such as a catheter or a hairpin, that have been introduced through the urethra, can at times be removed by the same route.

Dr. Kelly describes some methods he has employed for the removal of such objects. A speculum is introduced through the urethra into the bladder, and the body is seized by alligator-forceps and removed through the speculum, or it may be caught in a scoop, held against the end of the speculum, and withdrawn with the latter. Manipulation by fingers in the vagina may afford help. Dr. Kelly in this way was able to direct the end of a glass catheter into the urethra, down which it descended at once.

Failing removal in this way they would have to be removed by the vaginal or supra-pubic routes.

Calculi may be removed, either entire or after crushing, through the urethra, by means of a vaginal incision or by the supra-pubic route.

(1) *Removal through the Urethra*.—For the removal of a calculus entire the urethra will have to be dilated. Stones of large size have been removed in this way. Mr. Bryant mentions having removed stones 2 inches in diameter, and Dr. Dunlop records a case in which he removed a stone, $2 \times 2\frac{1}{8} \times 1\frac{1}{2}$ inches, slowly through the urethra without serious inconvenience¹ resulting.

Such an amount of dilatation of the urethra as this involves is not advisable. It is very likely to lead to permanent incontinence. The limit of dilatation that would appear to be safe is to 1-inch diameter. Dilatation should not be attempted in girls under fifteen years of age, nor in very elderly women, on account of the risk of rupturing the urethra, nor in cases where sphincter action is already weak (Cumston).

Owing to the ease with which stones may be removed entire through the urethra and vesico-vaginal septum, crushing of stone does not appear to have been used so frequently as in males. The chief difficulties lie in keeping sufficient fluid in the bladder and in the absence of a retro-prostatic pouch, into which fragments can fall after crushing. It is a method adaptable to stones

medium size and ready friability. Owing to the fact that a full-sized evacuator can be used, the calculus need not be reduced to such small fragments as in the male.

(2) *Vaginal Lithotomy* may be resorted to for large and very hard stones or when vesical infection renders drainage of the bladder necessary (Cumston). To perform the operation the patient is placed in the lithotomy position and a sound is passed into the bladder. An incision is made through the vesico-vaginal septum in the median line on to the sound and enlarged to a size sufficient to extract the calculus without bruising the wound. The edges of the incision are then carefully coapted by means of silkworm-gut and fine catgut sutures. Failure in union of the wound may occur when much bruising has attended the extraction of the calculus or when the urine is infected. The operation is not suitable for young girls, or for any case in which the vagina is narrow and the vulval outlet small.

(3) *Supra-pubic Cystotomy* is suitable to those cases in which a very large calculus exists or where owing to narrowness the vaginal route is not available. The operation is performed as follows: The bladder is distended with 8 to 10 oz. of boracic lotion. If there is a difficulty in getting the bladder to retain this, pressure should be made by an assistant on the urethra through the anterior vaginal wall. A median incision 3 inches long is made just above the pubes, the rectus sheath is opened and the muscles separated. The underlying fascia being divided, a layer of fat comes into view; this is torn through carefully at the lower part of the wound. The peritoneum, being exposed, is pushed up out of harm's way. The bladder is then opened and the stone removed with forceps or with a scoop and fingers.

Owing to the ease with which the female bladder can be drained through the urethra, there is less reason for leaving the abdominal wound open than in the male. It is safer to drain the bladder through the supra-pubic wound when cystitis exists or when there has been some difficulty in extraction of the stone and bruising of soft parts. In such cases the incision into the bladder should be partially closed with catgut sutures, an opening, sufficient to grasp a large rubber tube introduced into the bladder, being left. The wound in the abdominal wall is also partially closed with salmon-gut sutures. Either the urine is allowed to soak into dressings which are changed frequently or, what is much more comfortable, an apparatus is fixed over the wound to carry off the urine. A very good pattern is that known as the Irving apparatus for supra-pubic cystotomy. It may be described as an oval celluloid

box, without a base and with a movable lid. It is held closely to the abdominal wall by straps which pass round the body. Two rubber tubes lead off the urine from this to a bed-bottle placed between the thighs. The drainage tube can be removed in three or four days and the wound allowed to close up.

When the bladder is healthy, it may be closed by a series of catgut sutures carried down to, but not through, the mucous lining. It is safer not to completely close the abdominal wound for fear of leakage. The bladder is drained through the urethra by means of a self-retaining catheter for a week. The catheter should be removed once in the twenty-four hours and thoroughly cleansed.

VESICO-VAGINAL FISTULÆ.

These are caused most often by sloughing, the result of prolonged pressure on the soft parts by the child's head in difficult labour. They have been attributed commonly to the application of forceps, but there is no doubt that fistulæ result not so much from the use of forceps as from delay in their use. Less often a fistula is caused by a tear extending through the vagina into the bladder, or through perforation by an instrument or a sharp fragment of bone. The bladder may be opened accidentally or intentionally in the operation of hysterectomy, or an opening may be established by a pessary or by syphilitic or malignant ulceration.

The condition of a patient suffering from a fistula is a distressing one, and she is willing as a rule to undergo any operation to obtain relief. The only alternative to operation is the use of a portable urinal or the constant renewal of absorbent pads. These are both disagreeable measures, more particularly for an active woman, and do not relieve the irritation certain to result from the constant escape of urine. Whenever possible, an operation for the closure of the fistula should be performed.

Before this is undertaken a careful examination must be made of the condition present. The patient is placed in the lithotomy position, and the parts looked at in a good light with the aid of Sims's speculum. The opening will ordinarily be seen, and if large the bladder mucous membrane will bulge into the vagina. If the fistula cannot be found, milk should be injected into the bladder when the site of the opening will be shown by the escape through it of milk into the vagina. If the opening is into the cervix, milk will be seen coming from the external os.

The situation and size of the opening being noted, a most important point is to find out whether the edges of the fistula can be approximated in one or other direction without tension. Wheth— e

this can be done or not will depend partly upon the amount of tissue lost by sloughing, partly upon surrounding scar tissue. On the readiness with which the edges of the opening can be brought together will depend the ease of the operation.

Preparatory treatment will consist in washing out the bladder for some days when cystitis is present, and getting rid of external irritation by appropriate applications.

Operation.—In those rare cases in which a tear or perforation has occurred in the course of labour, there is no reason why the opening should not be treated in the same way as tears of the perineum and into the bowel. The escape of urine will be observed immediately after the labour, and the opening should be sewn up as soon as appropriate arrangements can be made for doing so. The same treatment should be adopted in the case of an injury to the bladder occurring in the course of an operation.

In the great majority of cases the fistula is due to sloughing, and an interval of about two months should elapse before an operation is undertaken. This allows time not only for the sloughs to separate and the wound to heal, but for contraction of the opening to take place. If it is a small one, it may close entirely, and large ones will contract until they are one-half or one-third their original size.

One feature essential to success is that the edges of the fistula should come together without exercising tension on the stitches.

If the operator has a case in which the edges can be readily approximated, he will proceed as follows:

The patient is placed in a good light in the lithotomy position, and the fistula is well exposed by a speculum and lateral retractors. With a tenotomy knife an incision is made in the vaginal mucous membrane round the fistula, about $\frac{1}{3}$ inch from its margin, and with fine curved scissors or the knife the mucous membrane is removed between this incision and the margin of the opening. This should be done freely, care being taken not to leave islets of mucous membrane or to encroach on the opening itself. In this way we get a broad, bevelled surface for approximation, which is now ready for suturing. The direction in which the edges most readily come together having been noted, a curved needle is threaded with silkworm gut and inserted in the vaginal mucous membrane, about $\frac{1}{8}$ inch from the edge of the pared surface. It is carried through the tissues and emerges at the edge of the opening, without, however, including the bladder mucous membrane. The needle traverses the opposite margin in the reverse order.

Other sutures are similarly inserted, about $\frac{1}{4}$ inch apart, and when sufficient of them have been introduced they are carefully tied. Fine catgut sutures can be introduced between the silkworm gut where the edges are not well in apposition, and care should be taken that the vaginal mucous membrane is not inverted.

A loose iodoform gauze plug is placed in the vagina and is changed every twenty-four hours for a few days. A self-retaining catheter is inserted into the bladder. This should be taken out and cleaned at least once in the twenty-four hours. The catheter can be dispensed with in a week's time, but care should then be taken that the patient does not get her bladder greatly distended. She should be made to empty her bladder at regular intervals, and if any difficulty in securing this exists, a catheter should be passed at regular intervals. In some cases, to avoid the necessity of emptying the bladder at night and the disturbance of the patient's rest, the self-retaining catheter may be replaced at night time.

The stitches should be removed in twelve or fourteen days, and particular care should be observed for a few days after their removal with respect to the regular emptying of the bladder.

When much loss of tissue has taken place, or when the fistula is surrounded and bound down by firm scar-tissue, great difficulty may be experienced in getting the edges of the opening together. Some ingenuity will be called for in meeting the demands of different cases. When a moderate degree of separation exists between the edges, I have often found that splitting the edges of the fistula widely has proved successful. For this purpose special fistula knives, curved to right and left, should be provided. The knife is inserted at the edge of the opening between the vagina and the bladder walls, and is carried all round for some distance in the cellular tissue or scar-tissue between the two organs. By this means the edges of the bladder can usually be made to meet, and are secured with fine catgut sutures. The edges of the vagina are then brought together, as wide a raw surface being opposed as is possible. The division of bands of scar-tissue affected in this way is often more successful than might be anticipated.

Another method that may be employed for relieving tension is that associated with the name of Jobert. It consists in pulling down the cervix, dividing the vagina through the anterior fornix and separating the cervix and bladder. This allows of considerable movement downwards of the bladder and vagina and of approximation of the edges of the fistula in a horizontal line.

Vesico-cervical Fistula.—The closure of this is effected by first

parating the bladder and uterus. The patient being placed in the photomy position, the cervix is seized with tenacula and pulled downwards. A transverse incision is then made in the anterior fornix close to the cervix, and carried through the vaginal wall to the cellular tissue between the cervix and bladder. A careful separation is made with finger and scissors until the fistula is reached. The bladder is separated from the cervix at this point, and the opening in it closed by two layers of catgut sutures, the edges of the bladder opening being turned in by this procedure. There is no need to close either the opening into the uterus or the wound made in the vaginal vault. A plug of iodoform gauze is inserted into the vagina and changed daily, the treatment of the bladder being carried out as already described.

CYSTITIS.

The bladder mucous membrane is not easily infected unless its resistance has been lowered or a site of entry provided by some form of injury. Owing to its anatomical arrangements the female bladder is more liable to be injured than the male organ, and we consequently find cystitis more frequently in women than in men.

Amongst the predisposing causes likely to lead to cystitis we may mention labour and operations, the pressure exercised on the bladder by the pregnant uterus or by tumours, over-distension of the bladder, more particularly in connection with the retroverted gravid uterus. A common cause is the decomposition of residual urine in cases of prolapse. The ordinary avenue of infection is through the urethra, organisms being carried into the bladder on septic catheters or from the patients' external parts, though infection may extend up the urethra independently of instrumentation. Direct extension of infection appears to occur at times from an inflammatory focus in the neighbourhood of the bladder, such as salpingitis.

The treatment will depend upon the cause. A calculus in the bladder should be removed. A prolapse by causing stagnation of urine should be replaced and kept up by a pessary. The possibility of infection being caused primarily and kept up by a lesion of the kidney should be borne in mind. This is particularly the case in tuberculous disease, and occasionally in connection with other forms of infection, such as the *Bacillus coli communis*.

Many cases of cystitis are preventable. No catheter that is not sterile should be used, nor should this be passed until the external urinary meatus, which has been exposed, has been thoroughly well cleansed, together with the surrounding parts. Over-distension of the bladder should be prevented by catheterisation. The great

importance of emptying the bladder at regular intervals in cases of retroverted gravid uterus, until the uterus has been replaced, must be insisted on, owing to the grave risk that exists of exfoliative cystitis. Apart from this condition very acute cystitis is not often seen. Ordinarily it is of moderate severity or subacute from the commencement.

The patient should be kept warm in bed, on light diet, and the bowels kept open. Heat locally, in the form of hot applications to the lower part of the abdomen, hot vaginal douches, and hot hip-baths should be employed. Urotropine in doses of 5 to 10 gr. should be given three times a day, and a mixture containing $\frac{1}{2}$ drachm each of citrate of potash and tincture of hyoscyamus to the dose.

If much pain exists, or micturition is so frequent as to be distressing, relief should be afforded by suppositories of morphia and belladonna. No attempt should be made in the acute stage to wash out the bladder.

When the acute symptoms have subsided, irrigation may be resorted to. In connection with this two points should be borne in mind. The solution used should not be irritating, and the quantity injected should be small. To commence with this should not be more than 2 oz. Either boracic acid, 1 drachm to 1 pint of water, or Thompson's boro-glyceride solution may be used. Sir Henry Thompson gave the following formula: "2 oz. of glycerine will hold in solution 1 oz. of bi-borate of soda; to this add 2 oz. of water. Let this be the solution, of which you add $\frac{1}{2}$ oz. to 4 oz. of water."

The washing out of the bladder is best carried out by means of a glass funnel and rubber tube, which can be attached to the end of the catheter, and which is provided with a stopcock. The catheter should be preferably of soft rubber. The tube should be filled with fluid to prevent air entering the bladder. The solution is then poured into the funnel and allowed to flow slowly into the bladder. As the last of the fluid is leaving the funnel, this is depressed below the level of the bladder, and the solution allowed to run out again. This procedure is repeated as often as is necessary.

In chronic cases numerous astringent and antiseptic solutions have been employed. Sir Henry Thompson regarded silver nitrate (of a strength of not more than $\frac{1}{2}$ gr. to 4 oz. of water to commence with, increasing gradually, if necessary, to $\frac{1}{2}$ gr. to 1 oz.) as being one of the most effective.

Dr. Kelly regards a solution of perchloride of mercury as of the utmost service in chronic cystitis. To begin with, a very weak

solution is employed of 1 in 100,000 of water, to which .6 per cent. of common salt has been added, the strength being increased to 1 in 10,000 or 1 in 5,000. When the urine is offensive, one or two drops of carbolic acid to 1 oz. of water may be used (Thompson).

In cases that have resisted all other modes of treatment, and that have much pain and great frequency of micturition, great relief is afforded by making an opening through the vesico-vaginal septum, and so draining the bladder and affording it complete rest for a time.

FISSURE OF THE NECK OF THE BLADDER.

This corresponds closely to fissure of the anus both in appearance and symptoms. Seen with the cystoscope it appears as a "linear ulceration, a centimètre or less in length, at the bottom of one of the folds of the vesico-urethral junction" (Dr. W. H. Baker).

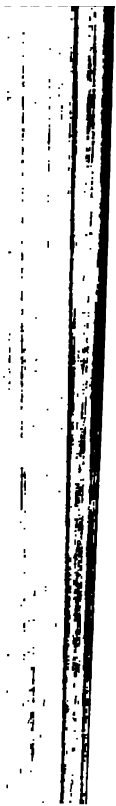
The symptoms are characteristic. There is extreme pain in micturition, lasting for some time afterwards, with frequency of the act. A little blood may escape with the urine, but the history of this is not always obtainable, and examination of the urine generally yields no evidence of anything abnormal.

Dr. Herman in his "Diseases of Women" gives a good account of this very painful affection, and I have found his method of treatment rapidly relieve the symptoms. It consists in dilating the urethra under an anæsthetic with Hegar's dilators up to No. 16 or 17.

G. BELLINGHAM SMITH.

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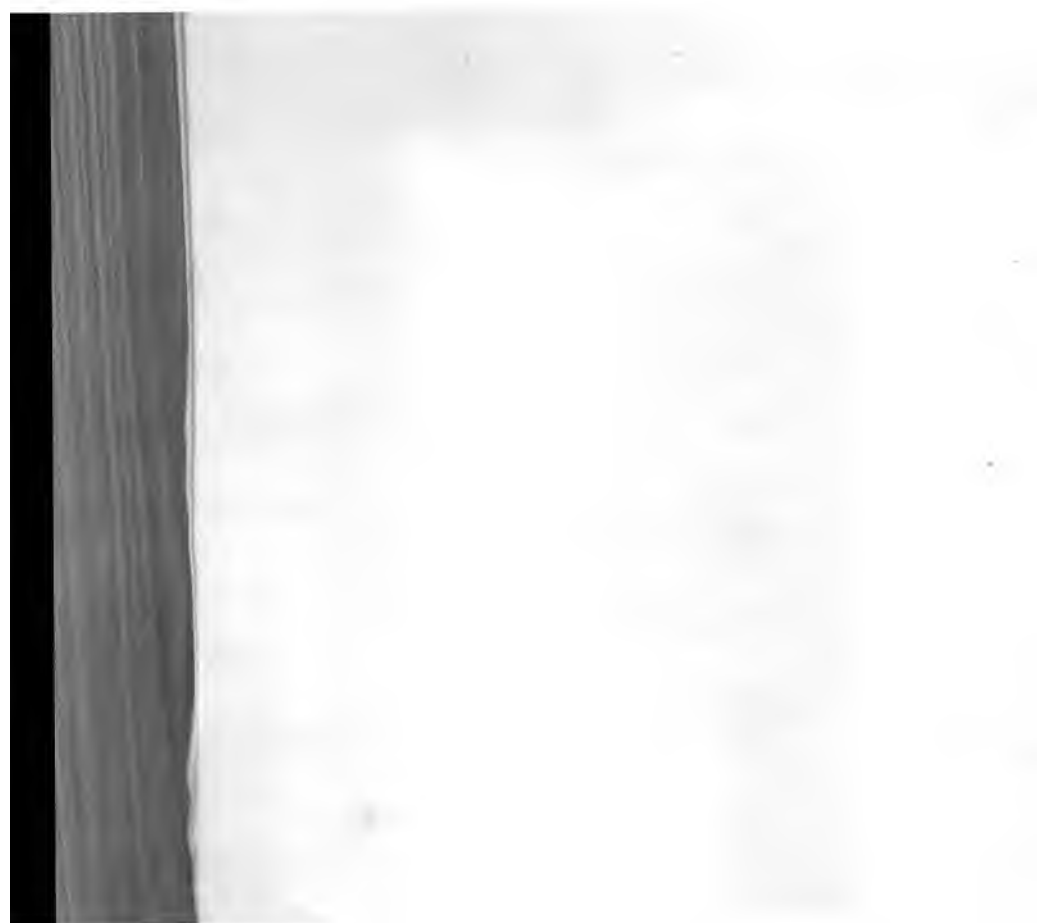
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